REPERMIT APPLICATION TO OPERATE A CLASS I LANDFILL

Iron County Armstrong and Lindsey Pit Operations

Submitted by:

IRON COUNTY
SOLID WASTE

Prepared by

IGES, INC.

4153 S. Commerce Drive

Salt Lake City, Utah 84107

January 20, 2006

ANNOTATED TABLE OF CONTENTS

INTRODUCTION

This document presents a repermit application to operate a Class I Municipal Solid Waste (MSW) landfill in the Armstrong Pit and incorporates the existing Class IVb Construction and Demolition (C&D) landfill in the Lindsey Pit into one permit. Both pits are located at the Iron County Landfill complex, which is owned by Iron County and operated by the Iron County Solid Waste (ICSW) personnel. Currently the Construction and Demolition Landfill – Lindsey Pit is operated as a Class IVb landfill under a separate permit. The Lindsey Pit is located immediately north of the existing MSW landfill in the Armstrong Pit. The Iron County MSW is currently operated under permit number 9401R1 issued by the Utah Solid and Hazardous Waste Control Board.

The area to be permitted is in Township 35 South, Range 12 West, Section 32, Salt Lake Baseline and Meridian, Iron County, Utah (See Drawing 1, Site Map in Appendix A).

In the four and one half years that have passed since the current permit was issued to Iron County Solid Waste for the operation of the Armstrong Pit, only minor changes to the operation of that pit have taken place. The addition of the Lindsey Pit is the major change in the way solid wastes are managed at the facility; all changes are reflected in this permit application.

This permit application does not represent a lateral expansion to the currently permitted landfill cells. It does, however, contain some changes in engineering and operational issues at the landfill. These changes include:

- <u>Changes to final cover configuration</u> – final cover contours have been slightly modified to enhance long-term landfill drainage.
- <u>Changes in waste stream volumes</u> - the actual volume of waste being delivered to the landfill is less than the original permit estimates, resulting in increased landfill life.
- <u>Plan of Operation</u> – The Plan of Operation has been revised to reflect current operational practices.

The following items, which have been previously permitted and are part of the operating record of the landfill, and since no changes in site conditions have occurred, will not be discussed in detail in this permit application:

- Liner Exemption – a liner exemption was granted during the initial landfill permit, therefore, no synthetic liner or cover materials are included in the Armstrong Pit.
- Leachate collection and removal system exemption – due to unique site conditions, the Armstrong Pit has been exempted from the incorporation of a leachate collection and removal system. Leachate generation is monitored by periodic sampling of a pan lysimeter located in the Armstrong Pit.

Part I of this document duplicates the standard form outlining general data pertaining to the site. Part II is a general report that includes a facility description and landfill operations plan. Part III is the Professional Engineering Report and includes details on the design of the site closure, post-closure care and financial assurance.

REPERMIT APPLICATION TO OPERATE A CLASS I LANDFILL

Iron County Armstrong and Lindsey Pit Operations

PART I – GENERAL INFORMATION

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

andfill Type	☒ Class I ☐ Class V	**II. Application Type**	☐ New Application ☒ Renewal Application	☐ Facility Expansion ☐ Modification	

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number 9401R1

III. Facility Name and Location

Legal Name of Facility
Iron County Class I Landfill

Site Address (street or directions to site) 3127 N. Iron Springs Road	County Iron

City Cedar City	State UT	Zip Code 84720	Telephone (435) 865-7015

Township 35S	Range 12W	Section(s) 32	Quarter/Quarter Section NW	Quarter Section

Main Gate Latitude degrees 37 minutes 43 seconds 03	Longitude degrees 113 minutes 13 seconds 48

IV. Facility Owner(s) Information

Legal Name of Facility Owner
Iron County

Address (mailing)
P.O. Box 743

City Cedar City	State UT	Zip Code 84720	Telephone (435) 865-7015

V. Facility Operator(s) Information

Legal Name of Facility Operator
Iron County Solid Waste

Address (mailing)
P.O. Box 743

Cedar City	State UT	Zip Code 84720	Telephone (435) 865-7015

VI. Property Owner(s) Information

Legal Name of Property Owner
Iron County

Address (mailing)
P.O. Box 743

City Cedar City	State UT	Zip Code 84720	Telephone (435) 865-7015

VII. Contact Information

Owner Contact Alan Wade	Title Supervisor

Address (mailing)
PO Box 743

City Cedar City	State UT	Zip Code 84720	Telephone (435) 865-7015

Email Address	Alternative Telephone (cell or other)

Operator Contact Alan Wade	Title Supervisor

Address (mailing)
PO Box 743

City Cedar City	State UT	Zip Code 84720	Telephone (435) 865-7015

Email Address	Alternative Telephone (cell or other)

Property Owner Contact	Title

Address (mailing)

	State	Zip Code	Telephone

Email Address	Alternative Telephone (cell or other)

Part I General Information (Continued)

VIII. Waste Types (check all that apply)

Waste Type	Combined Disposal Unit	Monofill Unit
Municipal Waste	☐	☐
Construction & Demolition	☐	☒
☐ Industrial	☐	☐
☐ Incinerator Ash	☐	☐
☐ Animals	☐	☐
☐ Asbestos	☐	☐
☐ PCB's (R315-315-7(3) only)	☐	☐
☐ Other ________	☐	☐

IX. Facility Area

Facility Area	____	acres
Disposal Area	34	acres
Design Capacity		
Years	99	
Cubic Yards	6601719	
Tons	3300860	

VIII. Waste Types (check all that apply)

Waste Type	Combined Disposal Unit	Monofill Unit
☒ Municipal Waste	☐	☒
☐ Construction & Demolition	☐	☐
☐ Industrial	☐	☐
☐ Incinerator Ash	☐	☐
☒ Animals	☐	☒
☐ Asbestos	☐	☐
☐ PCB's (R315-315-7(3) only)	☐	☐
☐ Other ________	☐	☐

IX. Facility Area

Facility Area	____	acres
Disposal Area	34	acres
Design Capacity		
Years	39	
Cubic Yards	3729395	
Tons	2080150	

X. Fee and Application Documents

Indicate Documents Attached To This Application — ☐ Application Fee: Amount $

☒ Facility Map or Maps ☒ Facility Legal Description ☒ Plan of Operation ☒ Waste Description
☒ Ground Water Report ☒ Closure Design ☒ Cost Estimates ☒ Financial Assurance

Class V Special Requirements
☐ Documents required by UCA 19-6-108(9) and (10)

I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.

Signature of Authorized Owner Representative: Kenneth A Wade	Title: Supervisor	Date: 2-21-06
Name typed or printed: Kenneth A Wade	Address: 3127 N Iron Spring Rd Cedar City	
Signature of Authorized Land Owner Representative (if applicable)	Title	Date
Name typed or printed	Address	
Signature of Authorized Operator Representative (if applicable)	Title	Date
Name typed or printed	Address	

REPERMIT APPLICATION TO
OPERATE A CLASS I LANDFILL

Iron County Armstrong and Lindsey Pit Operations

PART II - GENERAL REPORT

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1.0 - FACILITY DESCRIPTION

The Iron County Landfill (ICL) consists of the existing Class IVb Construction and Demolition (Lindsey Pit) Landfill and the existing Municipal Solid Waste (Armstrong Pit) Landfill. Both landfills are owned by Iron County and will be operated by Iron County Solid Waste (ICSW). The Lindsey Pit is located immediately north of the Armstrong Pit. Drawings 1 and 2 (Appendix A) show the location of the Armstrong and Lindsey Pits relative to the surrounding topographic features. The Lindsey Pit will be utilized exclusively for the disposal of construction and demolition (C&D) related waste while the Armstrong Pit will receive all other permitted wastes (primarily MSW).

The Armstrong and Lindsey Pits are located in abandoned iron mines. The topography immediately adjacent to each pit slopes downward toward the bottom of each pit due to the historic mining activities. The geometry of the pits (side-slope of a mountain) is such that the site run-on includes all direct precipitation on the side slopes surrounding each pit.

The physical address for the ICL is 3127 N. Iron Springs Road. The main access road to the site has been paved for all-weather access. The main access road leads from Iron Spring Road at the north uphill and south to the mouth of the Armstrong Pit. Access into the Lindsey Pit area is via an improved and maintained dirt road located off the main access road. The facility is entirely fenced, with public access through the locking gate at the main entrance of the solid waste facility. The site is approximately 12 miles northwest of Cedar City, Utah. A vicinity and site map is included on Drawing 1 in Appendix A.

1.1 AREA SERVED

The ICL serves all of Iron County with the exception of the C&D wastes disposed at the Parowan Class IVb landfill. The historic waste stream estimates in Iron County were approximately 290 tons/day in 2000, approximately 300 tons/day in 2001, and approximately 320 tons/day in 2002 based upon volumetric assessments. The initial C&D waste stream was estimated to be approximately 50% of the total waste entering the ICL. Actual measurements of the Iron County waste stream (based upon scale measurements) show that the initial estimates of waste were overestimating the waste stream by some 250%. Recent census data for Iron County has the 2003 population at approximately 35,741 residents.

ICSW is in the process of transforming the rate structure for solid waste transactions from a volume based system to a weight based system. Based upon the initial scale data; the annual tonnage for the wastes accepted at the facility appears to be approximately 37, 000 tons per year. The 37,000 tons per year averages out to a daily operational tonnage of approximately 120 tons per day. C&D represents approximately 26% of the total waste stream or approximately 30 tons per day. The average projected growth rate of the waste stream is anticipated to be approximately 2.5%.

1.2 WASTE TYPES

Based upon the projected waste stream currently processed at the ICL and the proportion of that waste stream anticipated to be diverted to the C&D operation from the differential tippage; the Lindsey Pit's may initially average up to approximately 30 tons per day of C&D waste while the Armstrong Pit takes approximately 90 tons per day of MSW. The differential tippage will hopefully result in an increase in the percentage of C&D diverted from the waste stream over time.

The waste diverted into the Lindsey Pit will be limited to the following wastes:

- Yard Waste – brush, branches, clippings, leaves and grass.
- Construction Wastes – waste generated from construction and includes building materials used in construction. Construction related materials include packaging materials from products, waste lumber, wallboard, boxes from appliances, empty paint cans, empty caulking tubes, and empty sealer and adhesive cans. "EMPTY" means that no more than 10% of the product remains inside the container.
- Demolition Wastes – waste generated from the destruction or remodeling of buildings and houses. Demolition Wastes may include furnaces, pipes, ducting and water heaters. Furniture and other materials that are not part of the building structure must be removed before demolition.
- Untreated wood, including pallets and crates
- Asphalt from roads and other surfaces

Wastes materials that are specifically prohibited from being placed in the Lindsey Pit (materials that will be managed in the Armstrong Pit) include the following:

- Household Wastes
- Contaminated Soils
- Friable asbestos
- Tanks of any kind
- Railroad ties
- Cardboard not directly generated from construction or demolition activities
- Furniture of all kind

- Metal not directly generated from construction or demolition activities
- Electronics of all kind
- Treated lumber

ICSW is currently separating white goods, scrap metal, used oil and diverting green waste in conjunction with the overall operation of the facility.

1.3 FACILITY HOURS

The operating hours for the facility are 8:00 a.m. to 6:00 p.m. year round. The facility is open Monday thru Saturday with the following holidays being observed:

- New Years Day
- Human Rights Day
- Presidents Day
- Memorial Day
- July 4th
- Pioneers Day
- Labor Day
- Columbus Day
- Veterans Day
- Thanksgiving Day
- Christmas Day

The following facility information is posted at the gate:

- Landfill Owner
- Days of Landfill Operation
- Hours of Landfill Operation
- Instructional Signs (no scavenging, no hazardous materials, dump in designated areas, etc.)
- Emergency Telephone Numbers

1.4 LANDFILL EQUIPMENT

The following equipment is on site and used in landfill operations:

- 826G Compactor

- 963 Track Loader
- D8R Track Dozer
- Off-highway truck
- (2) 10-wheel dump trucks
- Water tank insert (for 10-wheel dump truck)
- 936 Loader
- Caterpillar 140G Road Grader

1.5 LANDFILL PERSONNEL

The following briefly presents the responsibilities for all on-site landfill personnel at the ICL:

Landfill Supervisor - The Supervisor is responsible for all matters relating to the Solid Waste Program for Iron County; including landfill operations, drop boxes, and all recycling functions. The Supervisor is responsible that the landfill operations meet all Department of Solid and Hazardous Waste (DSHW) permit requirements. The Supervisor conducts regular facility inspections and monitors all landfill activities. The Supervisor is responsible for all operational documentation including the annual reports to DSHW. The Supervisor is responsible for all persons on the site including visitors.

Landfill Technicians – The landfill technicians are responsible for all day-to-day activities at the landfill. These responsibilities include, waste acceptance and placement, traffic control, visual inspection of incoming waste, random waste screening operations, and general construction as is pertains to landfill operations. The landfill technicians serve as both equipment operators and gatehouse attendants.

Mechanic – The landfill mechanic is responsible for the preventive maintenance and minor repair work on all landfill equipment. Responsibilities include maintaining equipment maintenance records, spare part inventories, and scheduling equipment vendors for required service calls.

Roll-off Truck Driver - The roll-off truck driver is responsible for the deployment, retrieval, and dumping of all roll-off's managed by ICSW. All roll-off truck drivers will maintain a valid Commercial Drivers License.

2.0 - LEGAL DESCRIPTION

The Armstrong and Lindsey Pits are located on property currently owned by Iron County. The ICL is located in Township 35 South, Range 12 West, in Section 32, Salt Lake Baseline Meridian, Iron County, Utah.

A copy of the legal description is included as Appendix B.

3.0 – OPERATIONS PLAN

The Operation Plan for the ICL has been written to address the requirements of Utah State Solid Waste Regulations R315-305 and describes the proposed operations of the Armstrong and Lindsey Pits. This updated Operations Plan reflects current landfill operations, data contained in the October 8, 1999 Operator's Manual, and changes in anticipated landfill operations.

The following section details the operational specifics of the Iron County Landfill. Forms used in the documentation of the operation are included in Appendix C.

3.1 SCHEDULE OF CONSTRUCTION

3.1.1 Construction & Demolition Waste (Lindsey Pit)

Construction of the Lindsey Pit has been broken down into four Phases (Drawing 3 – Appendix A); Phase I will consist of placing C&D waste into the bottom of the Lindsey Pit, elevation approximately 5460, to a relatively level area at elevation 5,500. Phase II will consist of the mass filling of the pit from the 5,500 foot level to elevation 5,600. Phase III will be the placing of C&D from the top of Phase II to elevation 5,700 and Phase IV will constitute the final Phase of landfilling that will extend the final surface to the final contours as indicated in Drawing 4. The landfill construction was presented in these Phases to facilitate: 1) development of the Lindsey Pit, 2) improvement of public access to the bottom of the pit, and 3) aid in the calculation of airspace and required cover soils. The Phases in the Lindsey Pit are identified by number while the Phases in the Armstrong Pit are identified as letters to distinguish the Phases in each pit. The section views of the Lindsey Pit are presented in Drawing 4 – Appendix A.

ICSW has improved the access road to the Lindsey Pit and started to receive C&D wastes once the initial permit for the pit was issued.

The operation of the C&D landfill will be continual in nature, the Phased arrangement is more of a design concept rather that actual operational milestones. Based on the projected waste stream, Phase

I will provide operational airspace for approximately the first 3 years, with design capacity being reached in the summer of 2004. Phase II will commence operation in the summer of 2004 and last until approximately the summer of 2023. Phase III will start upon the completion of Phase II and last until approximately 2051. Phase IV will start at the completion of Phase III and is projected to last until approximately 2094. The landfill capacities are based upon a C&D waste stream starting at 9,500 tons per year and escalating at 2.5% each year thereafter.

3.1.2 Municipal Solid Waste (Armstrong Pit)

The Armstrong Pit began accepting solid waste in September of 1994 with a gross airspace capacity of 4.9 million cubic yards. With a 25% reduction in airspace due to the inclusion of cover soils; the net airspace available for MSW is approximately 3.7 million cubic yards. The construction of the Armstrong Pit has been broken into four Phases (Drawing 5 – Appendix A). Phase A consisted of placing the MSW waste into the bottom of the Armstrong Pit to an elevation of approximately 5,800 feet. Phase B will consist of the mass filling of the pit from the final surface of Phase A to an elevation of 5,980 in the southwest (5,965 in the middle of the pit). Phase C will consist of placing MSW from the northeast side of Phase B (middle of the pit) to elevation 5,945 (approximately at the 2/3 rd point in the pit) and Phase D will constitute the final Phase of landfilling that will extend the final surface to the final contours as indicated in Drawing 5 – Appendix A.

The landfill construction was presented in these Phases to facilitate: 1) development of the Armstrong Pit, 2) development of public access to the working face, and 3) aid in the calculation of airspace and required cover soils.

The operation of the MSW landfill will be continual in nature, the Phased arrangement is more of a design concept rather that actual operational milestones. Based on the projected waste stream, Phase A provided operational airspace for approximately the first 5 years, with design capacity being reached approximately 1998. Phase B commenced operation in 1998 and will last until approximately 2025. Phase C will start upon the completion of Phase B and last until approximately 2038. Phase D will start at the completion of Phase C and is projected to last until approximately 2044. The landfill capacities are based upon a MSW waste stream in 2004 of approximately 27,500 tons per year and escalating at 2.5% each year thereafter.

The projection of the landfill life is presented in Appendix D.

3.2 DESCRIPTION OF WASTE HANDLING PROCEDURES

3.2.1 General

Since the commencement of operations of the ICL; several operational modifications have been made at the facility. The modifications to the waste handling procedures were necessary to ensure the separation of the C&D waste from the MSW waste. The waste control program is designed to detect and deter attempts to dispose MSW in the C&D pit and to minimize the potential of hazardous or unacceptable wastes being delivered to either pit. The program is designed to protect the health and safety of employees, customers, and the general public, as well as to protect against the contamination of the environment.

The landfill site is open for public and private disposal. Signs have been posted along the access road to clearly indicate (1) the types of wastes that are accepted at each facility; (2) the types of wastes not accepted at the site; and (3) the penalty for illegal disposal.

All vehicles delivering wastes to the site must stop at the scalehouse. Scalehouse personnel will inquire as to the contents of each incoming load to direct the driver to the MSW landfill, the C&D landfill, recycling area or to reject the load due to unacceptable materials. Any vehicle suspected of carrying unacceptable materials (liquid waste, sludges, or hazardous waste) will be prevented from entering the disposal areas unless the driver can provide evidence that the waste is acceptable for disposal at the site. ICSW reserves the right to refuse service to any suspect load. Vehicles carrying unacceptable materials will be required to exit the site without discharging their loads.

Once it is determined that the wastes entering the landfill are not of a hazardous or of an unacceptable nature, the driver is directed to either the Armstrong (MSW) landfill or the Lindsey

(C&D) landfill as appropriate. Any loads that contain MSW or materials not suitable for disposal in the C&D landfill will be directed to the Armstrong Pit. If the scalehouse personnel suspect that any load contains unacceptable materials, the scalehouse will then notify the a Landfill Technician that a load is suspect and that load will be further inspected at the C&D or MSW landfill tipping area before final disposal is allowed.

Loads will be regularly surveyed at each of the tipping areas. If a discharged load contains inappropriate or unacceptable material, the discharger will be required to reload the material and remove it from the landfill site. If the discharger is not immediately identified, the area where the unacceptable material was discharged will be cordoned off. Unacceptable material will be moved to a designated area for identification and preparation for proper disposal.

3.2.2 Waste Acceptance

ICSW uses a solid waste software package entitled "PC Scale". With this program ICSW is able to track all incoming waste as well as bill and receive payment from all customers. When a vehicle with waste stops on the scale; the scale operator identifies the load as to whether it is a commercial hauler, general public, or private individual with an account. The proper codes are entered into the computer identifying the origin, hauler, and account number. All loads larger than a pickup will be weighed and charged accordingly. Information regarding all transactions is stored on the in house computer at the landfill. All scale records are backed up on a weekly basis to minimize the potential for the loss of data. The information stored on the computer serves as the daily log. A monthly summary of all landfill transactions will be created and kept on file at the landfill. Any or all transactions may be retrieved as necessary.

No open burning is allowed. No smoking is allowed near the work face.

3.2.3 C&D Waste Disposal

The first phase of waste disposal in the C&D landfill (Phase I) involved end dumping the waste from the initial tipping area. The geometry of the pit is such that the C&D waste was dozed downslope into place. Once the bottom 40 feet of the pit was filled, then the C&D wastes were dumped at the toe of the work face when possible and spread up the slope in one to two foot lifts, keeping the slope at a typical five to one (horizontal to vertical) configuration. Due to the access restrictions of the first Phase (and the initial portion of the second Phase) of landfilling, ICSW personnel may elect to transfer C&D waste with ICSW personnel until sufficient access is developed to allow the general public safe access.

Typically the compactor is operated with the blade facing uphill. Equipment operations across the slope are avoided to minimize the potential of equipment tipping over. In addition to safety concerns, a toe of slope to crest of slope working orientation provides the following benefits:

- Increases effective compaction.
- Increased visibility for waste placement and compaction.
- More uniform waste distribution.

The C&D wastes will be compacted by making three to five passes up and down the slope. Compaction reduces litter, differential settlement, and the quantities of cover soil needed. Compaction also extends the life of the site, reduces unit costs, and leaves fewer voids to help reduce vector problems. Care is taken that no holes are left in the compacted waste. Voids are filled with additional waste as they develop.

Cover soils will be applied to all areas of the active cell at a minimum of every 30 days.

3.2.4 MSW Waste Disposal

The first phase of waste placed in the MSW landfill (Phase A) involved end dumping the waste from the initial tipping area into the lowest areas of the Armstrong Pit. The initial geometry of the pit was such that the waste was dozed downslope into place. Once the bottom of the pit was filled sufficiently to provide safe truck access to the working face; waste was delivered directly to the working face. Currently, waste delivered to the working face is dumped at the toe of the working face when possible and spread up the slope in one to two foot lifts, keeping the slope at a typical five to one (horizontal to vertical) configuration.

Work face dimensions will be kept narrow enough to minimize blowing litter and reduce the amount of soil needed for cover.

Typically the compactor is operated with the blade facing uphill. Equipment operations across the slope are avoided to minimize the potential of equipment tipping over. In addition to safety concerns, a toe of slope to crest of slope working orientation provides the following benefits:

- Increases effective compaction.
- Increased visibility for waste placement and compaction.
- More uniform waste distribution.

Since the Lindsey Pit has commenced operation; The Armstrong Pit currently receives MSW waste only. The wastes will be compacted by making three to five passes up and down the slope. Compaction reduces litter, differential settlement, and the quantities of cover soil needed. Compaction also extends the life of the site, reduces unit costs, and leaves fewer voids to help reduce vector problems. Care is taken that no holes are left in the compacted waste. Voids are filled with additional waste as they develop.

Cover soils will be applied to all areas of the active cell daily. Intermediate cover will be placed in active areas of the landfill that will not receive waste within 30 days.

3.2.5 Special Wastes

3.2.5.1 Used Oil and Batteries

ICSW provides the public the opportunity to drop off used oil as part of the operations of the ICL operations. ICL is a "Used Oil Recycle Center".

3.2.5.2 Bulky Wastes

White goods are accepted at the ICL and are separated for recycling. All appliances containing refrigerants are segregated in a separate area. Refrigerant is removed and the appliances are loaded into the metal bin for recycling. Used cars are accepted and stored near the Armstrong Pit.

3.2.5.3 Tires

ICL accepts small quantities of tires from the general public. Commercial haulers are prohibited from disposing of tires. A total of four passenger tires are accepted from the public with each load.

3.2.5.4 Dead Animals

Dead animals are accepted at the Armstrong Pit only. The dead animals are incorporated into the face of the landfill. The incorporation of the carcasses into the landfill is accomplished by pushing up the toe of the face and depositing the animal in the bottom of the toe; waste is then pushed over the top of the animal.

3.2.5.5 Asbestos Waste

Iron County Landfill has developed asbestos management procedures to minimize the risk of asbestos related waste to humans and the environment. Iron County Landfill accepts only locally generated asbestos waste. Asbestos generators and transporters are required to make arrangements for asbestos disposal at a minimum of 24 hours prior to delivery to the landfill.

Asbestos wastes shall be handled, transported, and disposed in a manner that will not permit the release of asbestos fibers into the air and must otherwise comply with Sections R307-1-4.12 and R307-8 and 40 CFR Part 61, Subpart M, 1995ed.

- Accept asbestos wastes by appointment only. Require a 24 to 48 hour notice.

- Do not accept friable asbestos waste unless it has been double bagged in plastic bags of 6-mil or thicker, and thoroughly wetted to prevent fiber release. Asbestos slurries must be in leak-proof and air-tight rigid containers if they are too heavy for plastic bags.

- All asbestos containers must be labeled with the name of the waste generator, the location where it was generated, and tagged with a warning label that conforms to the requirements of 40 Code of Federal Regulations (CFR) Part 61.149(2), 1991 ed.

- Upon arriving at the gate, the transporter of the asbestos must present a waste shipment record. The Landfill Technician will verify the quantities received and sign the waste shipment record. Iron County Landfill personnel will send a copy of the waste shipment record to the generator within 30 days.

- Direct the transporter to the asbestos trench for off-loading. Caution the transporter to take care not to break the containers. Cover the wastes immediately with at least 12 inches of soil.

- Do not compact asbestos wastes until they are completely covered with a minimum of 12 inches of non-asbestos material.

- Restrict public access to areas containing asbestos. The asbestos containing areas are to be properly marked. Warning signs will be placed at the entrance and around the perimeter of the disposal area at distances not exceeding 200 feet.

3.2.5.6 Grease By-Products

Waste from restaurant grease traps and related by-products are accepted at the ICL. If the waste passes the paint filter test, it is deposited in the Armstrong Pit and covered daily. The grease related wastes are typically stabilized by the addition of sawdust prior to transport to the ICL facility. ICL receives grease related wastes weekly.

3.2.5.7 Dry Sewer Sludge

Dry sewer sludge is accepted for disposal into the Armstrong Pit if both the paint filter test and all TCLP requirements are met.

3.2.5.8 Car Wash Sediment

Car wash sediment is accepted for disposal into the Armstrong Pit if both the paint filter test and all onsite screening criteria are met. ICSW has recently implemented a colorimetric screening (Hanby field test kit) procedure for oil and grease.

3.3 WASTE INSPECTION

3.3.1 Landfill Spotting

Learning to identify and exclude prohibited and hazardous waste from the ICL are required to maintain each landfill classification and necessary for the safe operation of the facility. The Landfill Technicians are required to receive initial and periodic hazardous waste screening inspection training. Waste screening certificates of the training received are kept in the personnel files.

3.3.2 Random Waste Screening

Random inspections of incoming loads are conducted according to the schedule established by the Landfill Supervisor. If frequent violations are detected, additional random checks are scheduled at the discretion of the Landfill Supervisor (typically 1 random check per 50 loads but no less than 1 random check per 100 loads).

If a suspicious or unknown waste is encountered, the Landfill Technician proceeds with the waste screening as follows:

- The driver of the vehicle containing the suspect material is directed to the waste screening area.
- The waste screening form (Appendix C) is completed.
- Protective gear is worn (leather gloves, steel-toed boots, and hard hat).
- The suspect material is spread out with landfill equipment or hand tools and visually examined. Suspicious marking or materials, like the ones listed below, are investigated further:
    - Containers labeled hazardous
    - Material with unusual amounts of moisture
    - Biomedical (red bag) waste
    - Unidentified powders, smoke, or vapors
    - Liquids, sludges, pastes, or slurries
    - Asbestos or asbestos contaminated materials

- Batteries
- Other wastes not accepted by the Landfill

- The Landfill Supervisor is called if unstable wastes that cannot be handled safely or radioactive wastes are discovered or suspected.

3.3.3 Removal of Hazardous or Prohibited Waste

Should hazardous or prohibited wastes be discovered during random waste screening or during tipping, the waste is removed from the Landfill(s) as follows:

- The waste is loaded back on the hauler's vehicle. The hauler is then informed of the proper disposal options.
- If the hauler or generator is no longer on the premises and is known, they are asked to retrieve the waste and informed of the proper disposal options.
- The Landfill Supervisor arranges to have the waste transported to the proper disposal site and then bill the original hauler or generator.

A record of the removal of all hazardous or prohibited wastes will be kept in the site operational records.

3.3.4 Hazardous or Prohibited Waste Discovered After the Fact

If Hazardous or prohibited wastes are discovered after the fact, the following procedure will be used to remove them:

- Access to the area is restricted.
- The Landfill Supervisor is immediately notified.
- The Landfill Technician removes the waste from the working face if it is safe to do so.
- The waste is isolated in a secure area of the landfill and the area cordoned off.
- Local authorities are notified as appropriate.

The DSHW, the hauler (if known), and the generator (if known) will be notified within 24 hours of the discovery. The generator (if known) is responsible for the proper cleanup, transportation, and disposal of the waste.

3.3.5 Notification Procedures

The following agencies and people are contacted if any hazardous materials are discovered at the Landfill:

- Alan Wade, Landfill Supervisor... (435) 865-7015
- Iron County Health Department... (435) 586-2437
- Executive Secretary, DSHW... (801) 538-6170
- Iron Co. Fire Department.. (435) 586-2964

A record of conversation is completed as each of the entities is contacted. The record of conversation is kept in the site operational records.

3.4 FACILITY MONITORING AND INSPECTION

3.4.1 Groundwater

The Lindsey Pit is not required to monitor groundwater. Groundwater monitoring of the Armstrong Pit is conducted as prescribed in the Groundwater and Leachate Monitoring Plan (Appendix E).

3.4.2 Surface Water

Run-on diversion structures have been installed around the perimeters of each of the pits. The diversion structures include both ditches and berms. Potential run-on waters are diverted before the waters drain onto the excavated slopes of the pit. Due to the variability of surface soil and rock outcroppings, the location of the drainage structures have been field located.

In general, surface water that falls within the pit excavation (below run-on diversion structures) will naturally be routed into the bottom of the pit. The run-on will be directed, where possible, away from the access road at the entrance to the active face.

Run-off from the final cover will be managed by a combination of berms and ditches. The berms will be placed to divert the water around the active area to ditches. Drawings 2 and 7 (Appendix A) illustrate the locations and details of the run-off control structures.

ICSW staff will inspect the drainage system monthly. Temporary repairs will be made as required to any observed deficiencies until permanent repairs can be scheduled. ICSW or a licensed general contractor will repair drainage facilities as required.

3.4.3 Leachate Collection

The Lindsey Pit is not required to collect or monitor leachate. The monitoring of leachate in the Armstrong Pit is conducted as prescribed in the Groundwater and Leachate Monitoring Plan (Appendix E).

3.4.4 Landfill Gas

The Lindsey Pit is not required to monitor landfill gas. Landfill gases are measured quarterly at the Armstrong Pit.

3.4.5 General Inspections

Routine inspections are necessary to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to release of wastes to the environment or a threat to human health. Landfill Technicians are responsible for conducting and recording routine inspections of the landfill facilities according to the following schedule:

- Landfill Technicians (when operating equipment) perform pre-operational inspections of all equipment daily. A post-operational inspection is performed at the end of each shift while equipment is cooling down.

- All equipment is on a regular maintenance schedule. The on-site mechanic performs all oil changes and a complete inspection of each piece of equipment at this time. A logbook is maintained on each piece of equipment and any repairs and comments concerning the inspection are contained in the log. Oil samples are pulled when each machine is serviced and results are recorded in the machine log.

- Facility inspections are completed on a quarterly basis. Any needed corrective action items are recorded and the Landfill Technicians complete needed repairs. If a problem is of an urgent nature, the problem is corrected immediately.

- Scale maintenance will be performed as required, with calibration performed annually at a minimum. The scale is certified on an annual basis.

3.5 CONTIGENCY AND CORRECTIVE ACTION PLANS

The following sections outline procedures to be followed in case of fire, explosion, run-on/run-off contamination, or suspected groundwater contamination:

The Iron County Fire Department is contacted in all cases where hazardous materials are suspected to be involved.

3.5.1 Fire

The potential for fire is a concern in any landfill. The ICL follows a waste handling procedure to minimize the potential for a landfill fire. If any load comes to the landfill on fire, the driver of the vehicle is directed to a pre-designated area away from the working face. The burning waste is unloaded, spread out, and immediately covered with sufficient amounts of soil to smother the fire. Once the burning waste cools and is deemed safe, the material will then be incorporated into the working face. Some loads coming to the landfill may be on fire but not detected until after being unloaded at the working face. If a load of waste that is on fire is unloaded at the working face, the load of waste is immediately removed from the working face, spread out, and covered with soil.

The Iron County Fire department is called if it appears that landfill personnel and equipment cannot contain any fire at the landfill. The Iron County Fire department is also called if a fire is burning below the landfill surface or is difficult to reach or isolate.

In case of fire, the Landfill Supervisor is notified immediately. A written report detailing the event is placed in the operating record within seven days, including any corrective action taken.

3.5.2 Explosion

If an explosion occurs or seems possible, all personnel and customers are accounted for and the Landfill is evacuated. Corrective action is immediately evaluated and implemented as soon as practicable.

The Landfill Supervisor is notified immediately and the Iron County Fire department is called. The Executive Secretary is notified immediately.

3.5.3 Failure of Run-On/Run-Off Containment

The purpose of the run-on/run-off control systems is to manage the stormwater falling in or near the landfill. Due to the geometry of the Lindsey and Armstrong Pits, run-on measures are limited. Were possible, water is diverted away from the landfill by utilizing ditches and berms. These ditches are inspected on a regular basis and repaired as needed. All precipitation falling on the side slopes of the Pits will flow towards the working area. The working face will be sloped to direct the run-on away from the access road.

As the landfill reaches an elevation where the storm water will drain from the Lindsey and Armstrong Pit areas, perimeter ditches and berms will be constructed. If a run-off ditch or berm fails, temporary berms or ditches will be constructed until a permanent run-off structure can be repaired.

Any temporary berms or other structures are checked at least every 2 hours during the storm event until storm water flow has stopped. Permanent improvements or repairs are made as soon as practicable.

The Landfill Supervisor is notified immediately if a failure of the run-off systems is discovered. The event is fully documented in the operating record, including corrective action within 14 days.

3.5.4 Groundwater Contamination

If ground water contamination is ever suspected, studies to evaluate the potential contamination will be conducted and the existence and/or extent of contamination will be documented. This program may include the installation of ground water monitoring wells. A ground water monitoring program would be developed and corrective action taken as deemed necessary, with the approval of the Executive Secretary.

3.6 CONTINGENCY PLAN FOR ALTERNATIVE WASTE HANDLING

The most probable reason for a disruption in the waste handling procedures at the ICL will be weather related. The Landfill(s) may close during periods of inclement weather such as high winds, heavy rain, snow, flooding, or any other weather-related condition that would make travel or operations dangerous. The ICL may also close for other reasons like fire, natural disaster, etc. In general, the ICSW staff minimizes the possibility of disruption of waste disposal services from an operational standpoint.

In case of equipment failure, replacement equipment will be rented or leased to continue operations while repairs are being made. In the event of a disruption of service at the Iron County Landfill; wastes will be redirected to either the Parowan Landfill for Construction and Demolition waste or to Beaver County Landfill for MSW wastes.

3.7 DISEASE AND VECTOR CONTROL

The vectors encountered at the ICL are flies, birds, mosquitoes, rodents, skunks, and snakes. Due to the rural location of the landfill, stray house pets are occasionally encountered at the landfill. The program for controlling these vectors is as follows:

3.7.1 Insects

Eliminating breeding areas is essential in the control of insects. ICSW will minimize the potential breeding areas by covering the waste with soil at a minimum of daily (Armstrong Pit) and every 30 days (Lindsey Pit) and maintaining surfaces to reduce ponded water.

3.7.2 Rodents

Reducing potential food sources minimizes rodent populations at the landfill. Due to the nature of the C&D wastes, no significant numbers of mice or rats are anticipated at the Lindsey Pit. The application of daily cover at the Armstrong Pit will minimize the potential food sources and the potential for rodents.

In the unlikely event of a significant increase in the number of rodents at the ICL, a professional exterminator will be contacted. The exterminator would then establish an appropriate protocol for pest control in accordance with all county, state and federal regulations.

3.7.3 Birds

It is anticipated that the ICL will have minimal problems with birds. Good land filling practices of waste compaction, daily covering of working faces, and the minimization of ponded water will alleviate most of the bird problems. If the occasional need arises, the birds will be encouraged to leave by using cracker and whistler shells.

3.7.4 Household Pets

Because of the landfill's location, some stray cats and dogs have wandered onto landfill property. When stray animals are encountered (and can be caught), they are turned over to the animal shelter. If the Landfill Technicians are unable to apprehend the animals, they are chased off the property.

3.7.5 Wildlife

The ICL has a variety of wildlife located on or near the landfill property. Wildlife includes deer, snakes, foxes, skunks, and coyotes. If problem skunks or snakes are encountered, they will be exterminated. If other site wildlife becomes a problem, the landfill will coordinate with the Division of Wildlife Resources to provide methods and means to eliminate the problem.

In the event that any of these vectors become an unmanageable problem, the services of a professional exterminator will be employed.

3.7.6 Fugitive Dust

The road leading to the Armstrong Pit is paved, however; the access road to the Lindsey Pit is an improved dirt/gravel road and will need occasional dust control measures. General landfill activities, site access by vehicles compounded by the occasional high wind may present a fugitive dust problem. If the dust problem elevates above the "minimum avoidable dust level", the landfill applies water to problem areas.

The ICL has a water tank that is placed into a 10-wheel dump truck and used to suppress the dust. Water is applied to the paved roads leading from the landfill office to the tipping face and at the tipping face. The water is applied as often as needed to control the dust.

3.7.7 Litter Control

The geometry of the Lindsey and Armstrong Pits naturally minimize the blowing of litter. However; due to the nature of landfilling operations, blowing litter will still be an occasional problem. Landfill personnel perform routine litter cleanup to keep the landfill and surrounding properties clear of windblown debris.

Whenever possible, the working face is placed down wind so that blowing litter is worked into the landfill face. During windy conditions, landfill personnel minimize the spreading of the waste to reduce the amount of windblown debris. The prevailing wind on the site is from the southwest to the northeast.

3.8 RECYCLING

Currently, recycling activities are conducted in conjunction with the ongoing MSW and C&D operations. The bulk of materials recycled are metals and green waste.

3.9 TRAINING PROGRAM

As part of the initial training of new employees, the Landfill Operator's Manual is required reading. All personnel are required to review the approved permit annually.

All personnel associated with the operation of the landfill receive site specific training annually. The "Sanitary Landfill Operator Training Course" offered by the Solid Waste Association of North America (SWANA) is required by all employees. SWANA waste screening is also required of all Landfill Technicians. Certificates of completion are kept in personnel files.

Regular safety and equipment maintenance training sessions are held to ensure that employees are aware of the latest technologies and that good safety practices are used at all times.

3.10 RECORDKEEPING

An operating record is maintained as part of a permanent record on the following items:

- Vehicle weights, number of vehicles entering the landfill and types of wastes received on a monthly basis. Daily logs are stored on the computer.
- Deviations from the approved Plan of Operation.
- Personnel training and notification procedures.
- Random load inspection log.

3.11 SUBMITTAL OF ANNUAL REPORT

ICSW will submit a copy of its annual report to the Executive Secretary by March 1 of each year for the most recent calendar or fiscal year of facility operation. The annual report will include facility activities during the previous year and will include, at a minimum, the following:

- Name and address of facility.
- Calendar or fiscal year covered by the annual report.
- Annual quantity, in tons or volume, in cubic yards, and estimated in-place density in pounds per cubic yard of solid waste.
- Annual update of required financial assurances mechanism pursuant to Utah Administrative Code R315-309.
- Training programs completed.

3.12 INSPECTIONS

The Landfill Supervisor, or his/her designee, will inspect the facility to minimize malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes to the environment or to a threat to human health. These inspections are conducted on a quarterly basis, at a minimum. An inspection log (Appendix C) is kept as part of the operating record. This log includes at least the date and time of inspection, the printed name and handwritten signature of the inspector, a notation of observations made, and the date and nature of any repairs or corrective actions. Inspection records are available to the Executive Secretary or an authorized representative upon request.

3.13 RECORDING WITH COUNTY RECORDER

Plats and other data, as required by the County Recorder, will be recorded with the Iron County Recorder as part of the record of title no later than 60 days after certification of closure.

3.14 STATE AND LOCAL REQUIREMENTS

The ICL will maintain compliance with all applicable state and local requirements including zoning, fire protection, water pollution prevention, air pollution prevention, and nuisance control.

3.15 SAFETY

Landfill personnel are required to participate in an ongoing safety program. This program complies with the Occupational Safety and Health Administration (OSHA), and the National Institute of Occupational Safety and Health (NIOSH) regulations as applicable. This program is designed to make the site and equipment as secure as possible and to educate landfill personnel about safe work practices.

3.16 EMERGENCY PROCEDURES

In the event of an accident or any other emergency situation, the Landfill Technician immediately contacts the Landfill Supervisor and proceeds as directed. If the Landfill Supervisor is not available, the Landfill Technicians calls the appropriate emergency number posted by the telephone. The emergency telephone numbers are:

- Iron County Central Dispatch 911
- Fire Department ....(435) 586-2964
- Sheriff's Office ....(435) 867-7500
- Cedar City Hospital.. (435) 586-6587
- Alan Wade, Landfill Supervisor.. (435) 586-7015

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Iron County Armstrong and Lindsey Pit Operations

PART III - TECHNICAL REPORT

TABLE OF CONTENTS

SECTION 1 - GEOHYDROLOGICAL ASSESSMENT

1.1 GEOLOGY AND HYDROLOGY

1.1.1 Regional Geology

The geology and hydrogeology of this site have been studied for many years by government agencies and mining companies. Previous work at Granite Mountain was complied by MacKin, Nelson and Rowley (1976) and was fully detailed by Tahoma Resources (1990) in a previous landfill permit application. The geology of the Iron Springs district, which contains the Landfill, is complex. The area is in the transition zone between the Colorado Plateau and the Basin and Range provinces, and has been structurally active since at least early Cretaceous time. This activity has created several faults which influence the aquifers in the area.

1.1.2 Local Geology

The Landfill is underlain by Mesozoic sedimentary rocks of the Carmel and Iron Springs formations intruded by middle Tertiary quartz monzonite of the Iron Springs laccolith. Quartz monozonite extends to a depth of at least 4,900 feet below the Landfill, where it is underlain by Navajo Sandstone. The Landfill is bounded along the southeast by the extinct Cory-Armstrong fault zone. Late Tertiary to recent gravels that locally cover the east slope of Granite Mountain are not offset by the Cory-Armstrong Fault.

1.1.3 Hydrology

The closest stream is Iron Springs Creek, an ephemeral flow, located approximately three miles northeast of the site. Small dry washes are located near the Landfill site, which convey surface flows from the Granite Mountains located northwest of the site.

1.2 SOIL CHARACTERISTICS

The nature of extensive mining over several decades has resulted in the general absence of a soil matrix near each of the pits. Daily cover materials are created from the weathered bedrock and from previously milled rock material.

1.3 HYDROGEOLOGY AND GROUNDWATER

The most recent groundwater data and assessment are included in the Annual Groundwater Monitoring Report – 2003 (Appendix F)

1.4 WATER RIGHTS

A search of the Utah Division of Water Rights database indicates a single water right located approximately ½ mile to the northeast of the site boundary. The database indicated that the water right is for a surface diversion used for stock watering.

1.5 SURFACE WATER

The nearest stream is Iron Springs Creek, an ephemeral flow, located approximately three miles north-northeast of the site. Small dry washes are located near the Landfill and will convey surface flows toward the Landfill. These flows will be generated by precipitation/snowmelt from the eastern slopes of the Granite Mountains located immediately northwest of the site.

There are no wetlands located in the vicinity of the site, therefore the Landfill will not adversely affect the wetland environment or any wildlife associated with wetlands.

1.6 WATER QUALITY

1.6.1 Regional Ground Water Quality

Total-dissolved-solids (TDS) concentrations of Cedar Valley groundwater ranged from 158 to 2,752 mg/L (158 - 2,752 parts per million) in 1978 (Hurlow, 2002). The source of dissolved material is often the rocks through which the water flows. Gypsum, for example, contributes significant quantities of sodium and calcium to groundwater. In Cedar Valley, groundwater is generally classified as either a calcium-bicarbonate type or a magnesium-sulfate type, and is suitable for most uses. Bjorklund and others (1978) did note, however, that the "concentration of dissolved solids tends to increase with time in areas where large quantities of water are pumped for irrigation."

The basin-fill aquifer is the principal source of drinking water for residents of Cedar Valley. Potential groundwater pollution sources include underground storage tanks, sewage lagoons, septic tank soil-absorption systems, and agricultural fertilizer. Domestic waste-water in rural areas and some subdivisions is disposed of in on-site individual waste-water disposal systems. Residential development, agriculture, and manufacturing are all taking place on the basin-fill aquifer.

The principal groundwater contaminant identified in the Cedar Valley basin-fill aquifer is nitrate. Concentrations in water wells in 1979 ranged from less than 0.06 mg/L to 57.4 mg/L (0.06 - 57.4 parts per million) (Joe Melling, Cedar City Manager, formerly with the Southwest Utah Public Health Department, written communication, 1979). Nineteen of these wells exceeded 10 mg/L

(10 parts per million) (current Utah groundwater quality standards permits a maximum nitrate concentration of 10 mg/L). The high-nitrate wells are distributed throughout Cedar Valley, rather than concentrated in a single area of high-nitrate concentration. High-nitrate wells are more common near the Hurricane fault on the east side of the valley (Eisinger 1998).

1.6.2 Site Specific Ground Water Quality

The most recent groundwater quality data and assessment are included in Annual Groundwater Monitoring Report – 2003 (Appendix F)

1.7 SITE WATER BALANCE

Among the possible problems created by waste storage in any landfill is the possible contamination of soil, surface water or groundwater by direct contact with the waste or by leached materials from water passing through the waste. Due to low annual precipitation and high annual evapotranspiration (evapotranspiration is the loss of water from soil by both evaporation and transpiration from plant growth) rates associated with the semi-arid climate in the Cedar Valley, the quantity of water infiltrating the Landfill is predicted to be small and therefore the leachate generation low.

Based on the Landfill design, the arid climatic conditions (11.5 inches of rainfall vs. 49 inches of evaporation per year), in-situ soil conditions, geologic obstacles to groundwater flow, and the operational constraint of no liquid waste disposal, significant leachate generation from the cells of the Landfill and its impacts to underlying groundwater is considered to be minimal.

Previous site water balance studies utilizing the HELP software evaluated the sites potential to generate leachate. The results of the previous HELP analysis are included in Appendix G.

SECTION 2 - ENGINEERING REPORT

2.1 LOCATION STANDARDS

The following sections present the Solid Waste Facility Locations Standards and discuss the status of the Iron County Landfill compliance with those requirements.

2.1.1 Land Use Compatibility

The UDEQ Division of Solid and Hazardous Waste's Solid Waste Permitting and Management Rules state that no Class I, Class II or a Class V landfill will be located within:

- One thousand feet of a national, state or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.
- Ecologically and scientifically significant natural areas, including wildlife management areas and habitat for listed or proposed endangered species, as designated pursuant to the Endangered Species Act of 1982.
- Farmland classified or evaluated as prime, unique, or of statewide importance by the U.S. Department of Agriculture, Soil Conservation Service, under the Prime Farmland Protection Act.
- One-quarter mile of existing permanent dwellings, residential areas, and other incompatible structures, such as, schools, churches, and historic structures or properties listed or eligible to be listed in the State or National Register of Historic Places.
- Proximity to an airport.
- Areas with respect to archeological sites.

2.1.1.1 Iron County Landfill (ICL) Status

- The ICL is not located within 1,000 feet of a national, state, or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.
- Ecologically or scientifically significant natural areas have not been observed within or adjacent to the current site. This site is an active Landfill and has been used as such since 1994.
- There are not soils within the Landfill property boundaries that are classified prime soil types for farmland use according to the Soil Conservation Service (SCS) maps of Iron County. Therefore, the site is not considered within a unique or important farmland zone.
- There are no schools, churches, historic structures, or properties eligible to be listed in the State or National Register of Historic Places currently located within

one-quarter mile of the property line that encloses the area currently being operated as a Landfill.

- The Landfill is not located within 10,000 feet of a public-use airport runway used by turbojet aircraft. The closest airport is located near Cedar City approximately 8 miles from the site.
- No archaeologically significant discoveries have been made at the site, nor are any known to exist.

2.1.2 Geologic Hazards and Geotechnical Engineering

The Utah State Regulations indicate "No new facility or lateral expansion of an existing facility shall be located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, above a salt bed, or on or adjacent to geologic features which could compromise the structural integrity of the facility".

Neither of the Landfill areas are located in a subsidence area, a dam failure flood area, above an underground mine, above a salt dome, or above a salt bed as mentioned in the Utah State Regulations (Harty, 1993). However, the Landfill area is located on the eastern slope of the Granite Mountains. Geologic hazards such as debris flows, alluvial fan flooding and faulting can be a potential concern in this area and were therefore assessed.

2.1.2.1 Debris Flows and Alluvial Fan Flooding

The site is located in the mountains and according to geologic mapping of the area is not on an alluvial fan where flooding or debris flows have historically taken place and the potential for future occurrence is considered to be low.

2.1.2.2 Liquefaction

Certain areas within the intermountain region also possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

Because the facility is founded largely on exposed bedrock the site has a very low potential for liquefaction and it should not be considered a concern for this site.

2.1.2.3 *Seismicity and Faulting*

The site is situated near the eastern boundary of the Intermountain Seismic Belt, which is characterized by active seismicity and extensional normal faulting. There are no known active faults that pass under or immediately adjacent to the site (Averitt and Threet, 1973; Hecker, 1993). The site is located approximately 10 to 12 miles west of the Cedar City-Parowan monocline. The Cedar City-Parowan monocline and three faults in the general vicinity of the site show evidence of Holocene (less than 10,000 years old) movement. The Enoch Graben is located approximately 12 miles northeast of the site, the Hurricane fault is located approximately 14 miles east of the site, and the Parowan Valley fault is located approximately 24 to 32 miles northeast of the site. These three faults are reported to have been active in Holocene time (Hecker, 1993). In addition, the University of Utah Seismograph Stations publishes seismograph records of events throughout Utah. These records show several historical seismic events that occurred in the Cedar City area, with magnitudes generally less than 4 to 5. Based on these conditions, the potential exists for moderate to high earthquake-induced ground motions at the site.

2.1.2.4 *Seismic Impact Zone*

The EPA and the DSHW define a seismic impact zone as any location with a 10% or greater probability that the maximum horizontal acceleration (MHA) in lithified earth material, expressed as a percentage of the earth's gravitational pull, will exceed 0.10g in 250 years.

The MHA in lithified earth material is defined in 40 CFR part 258.14 (EPA 1995) as the "maximum expected horizontal acceleration depicted on a seismic hazard map with a 90% or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on site specific seismic risk assessment." Seismic hazard maps depicting probabilistic ground motions and spectral response have been developed for the United States as part of NEHRP/NSHMP (Frankel et al, 1996; FEMA, 1997). These maps serve as the basis for the International Building Code (IBC). Using NEHRP-based interactive software developed by Leyendecker et al. (2000), probabilistic spectral accelerations corresponding to the MCE (maximum considered earthquake) seismic hazard levels were identified for the site, assuming rock-like conditions. The MCE is often associated with a 2PE50 hazard level (equivalent to the 90% or greater probability that the acceleration will not be exceeded in 250 years). These spectral accelerations are consistent with 5% damping. To account for site effects, site coefficients which vary with the magnitude of spectral acceleration should be used to modify the bedrock-based spectral acceleration values. Based on information collected during previous boring explorations (Bingham Environmental, 1999) we believe that the site is best described by Site Class B "rock". Corresponding site coefficients are shown in the following table.

Seismic Event	Spectral Period	Mapped Acceleration (g)	Site Coefficient
MCE	PGA *	0.26	1.00
	0.2 sec (short)	0.65	1.00
	1.0 sec (long)	0.20	1.00

* Back-calculated based on standard spectral shape

Based on this information, the Maximum Horizontal Acceleration anticipated at the site is 0.26g. Therefore, the site does lie within a Seismic Impact Zone defined by the EPA and the DSHW.

2.1.2.5 Seismic Impact Zone Analysis

Cross-sections of the bottom excavation and final cover were generated and used in modeling static and seismic stability. The most critical section (section with the steepest final slope) was modeled. Section B of the Lindsey pit was selected as the most critical section for seismic slope stability analysis based on the final side slopes and fill height. Final side slopes are planned to be 4 horizontal to 1 vertical. The sections and stability results are presented in Appendix H – Slope Stability.

Two material types were used for the stability analyses: foundation (insitu) bedrock and municipal solid waste (MSW). The following table presents the strength and unit weight parameters used in the stability analyses:

Property	Foundation Bedrock	MSW
Unit Weight (pcf)	150	68
Cohesion (psf)	3000	150
Friction Angle (deg.)	27	30

The bedrock strength parameters were derived based on the local geologic conditions described in Section 1.1.2 and the Hoek-Brown failure criterion (Hoek et al. 2002) to develop an equivalent continuum strength parameters for the stability analysis. Due to limited laboratory and field data for the bedrock, lower bound values were used for the rock mass classification; resulting in more conservative bedrock properties. However, a parametric stability analysis indicated the global stability of the fill was not sensitive to the bedrock strength parameters due to the lower strength of the MSW.

Municipal unit weight parameters were estimated based upon historical data (Kavazanjian, et. al., 1995). Based on this study (typical unit weight values range from 41 to 83 pcf, with an average range of 54 to 68 pcf); a value of 68 pcf was selected for this analysis. Strength parameters were selected based on large scale direct shear testing performed insitu at the Dekorte Park Landfill in New Jersey which were found to correlate well with back calculated parameters from sites which experienced slope failures (Withiam et al., 2000). Strength parameters and unit weight were assumed constant with depth.

Static and pseudo-static analyses of the slope sections were performed using the most critical section of the landfill geometry and the bedrock and MSW parameters outlined previously. Results are presented in Appendix H – Slope Stability. The static and pseudo-static slope stability analyses were completed using the computer program GSTABL7.

Information from Singh and Sun (1995) suggest the potential for amplification of the ground motion as it propagates to the surface (top) of the Landfill. Using the IBC "rock" acceleration of 0.26g and the upper bound response given by Singh and Sun (1995), the maximum horizontal acceleration anticipated at the surface of the landfill is 0.36g. This acceleration was used in the deformation analysis under seismic conditions.

Simplified Newmark seismic deformation analyses were performed using the upper bound (conservative) relationships given by Hynes-Griffin and Franklin (1984). The yield acceleration of 0.35g was computed for the most critical section of the Landfill. Using the yield acceleration and the anticipated attenuated ground acceleration the seismic induced deformation is anticipated to be less than one foot.

Section	**Static Factor of Safety**	**Yield Acceleration**	**Attenuated Acceleration at the Top of Landfill**	**Anticipated Seismic Induced Deformation (feet)**
Lindsey Pit – Section B	2.73	0.35g	0.36g	<1

Typical allowable limits in stability analyses are; a minimum factor safety of 1.5 during static conditions and a maximum allowable deformation of 1 foot. Based on the results of the analyses performed using the planned geometry of the landfill the stability of the slopes are above the minimum standards.

2.1.2.6 Unstable Areas

An unstable area means "a location that is susceptible to natural or human induced events or forces capable of impairing the integrity of some or all of the landfill structural components responsible for preventing releases from a facility". Unstable areas include poor foundation conditions or karst terrain resulting in excessive differential settlement, or areas susceptible to mass movement liquefaction.

The site is located on bedrock deposits that are not susceptible to mass movement, liquefaction or excessive foundation settlement. The site is not located within a public watershed and no water retention facilities are located within a reasonable distance down gradient from the site.

2.1.3 Surface Water Requirements

UDEQ has adopted Subtitle D location restrictions for floodplains, wetlands and watersheds. The Landfill site does not currently fall within a delineated 100-year flood zone. There are no known or designated wetlands within the limits of the Landfill boundary. The Landfill is not located in a watershed for a public water system or a location that could cause contamination of a lake, reservoir, or pond. There are no known endangered or threatened species within the Landfill area.

2.1.3.1 Floodplain

There has been very little, if any, floodplain mapping performed outside of incorporated city boundaries in southern Utah. Floodplain mapping for the Cedar City area does not extend west of the airport and as a result the site is not mapped in a potential floodplain. Iron Springs Creek is also located approximately 200 feet below the site and flooding of this creek should not be a concern at the Landfill.

2.1.4 Groundwater Requirements

UDEQ location restrictions with respect to groundwater protection include the following:

- No new facility shall be located at a site where the bottom of the lowest liner is less than 5 feet above historical high levels of groundwater in the uppermost aquifer.
- No new facility shall be located over a sole source aquifer as designated in 40 CFR 149.
- No new facility shall be located over groundwater classified as IB under Section R317-6-3.3 (an irreplaceable aquifer).
- A new facility located above any aquifer containing groundwater which has a total dissolved solids (TDSs) content below 1,000 milligrams per liter (mg/l) and does not exceed applicable groundwater quality standards for any contaminant is permitted only where the depth to groundwater is greater than 100 feet. For a TDS

content between 1,000 and 3,000 mg/l, the separation must be 50 feet or greater. These separation distance requirements are waived if the landfill is constructed with a composite liner.

- No new facility shall be located in designated drinking water source protection areas or, if no such protection area is designated, within a distance to existing drinking water wells or springs for public water supplies of 250-day groundwater travel time.

2.1.4.1 Iron County Landfill Status

The lowest point of the bottom of the Landfill is at least 250 feet above the highest observed groundwater elevation noted in the monitoring wells on and surrounding the site. Groundwater beneath the Landfill area is not classified as a sole source or Class IB (irreplaceable aquifer). A groundwater transport study was not conducted as part of this investigation. Based on this information the Iron County Landfill does meet the requirements of the groundwater protection location restrictions.

2.2 PHASED DESIGN - PROPOSED LANDFILL DEVELOPEMENT

As described in Section 3.1 of Part II; each of the Landfills will be developed in Phases. The following sections discuss the development of future Phases and the incremental filling of each of the Landfills.

2.2.1 Estimated Life

The projected wastestream for the Landfill will come from Iron County. Estimated daily waste tons being delivered to the ICL operations is approximately 165 tons per day based on recent records. Lindsey Pit (C&D) receives approximately 45 tons per day while the Armstrong Pit (MSW) receives approximately 120 tons per day. Only limited distinction is made in the records between residential and commercial waste disposal. The anticipated future air space consumption has been evaluated based upon a 2.5% wastestream increase.

All volume calculations were made using Autodesk Civil Design software earthwork package integrated into AutoCAD. Elevations for the ground surface were initially obtained by conventional aerial surveying methods and have been periodically updated using Global Positioning System (G.P.S.) survey methods. As earthwork and ongoing landfilling continues at the site, G.P.S. data will be used to update the base topographic map.

The Landfill life projections are only estimates; the actual life of the Landfill will depend on several variables including the actual rate of waste being delivered, densities, settlement and the potential use of alternate daily cover materials.

2.2.1.1 Armstrong (MSW) Phase A

Iron County has been accepting municipal solid waste in the Armstrong Pit since September of 1994. Consumption of airspace between 1994 and the preparation of this application have been reflected in the Landfill life analysis with Phase A lasting until approximately 1998. Phase A had capacity for approximately 383,000 cubic yards of MSW and soil. The locations of the Armstrong Phases are illustrated on Drawings 5 and 6 in Appendix A.

2.2.1.2 Armstrong (MSW) Phase B

Phase B began operation as Phase A was complete. Phase B has approximately 2,100,325 cubic yards of airspace available. The airspace will provide landfilling capacity for approximately 27 years with capacity being reached in approximately 2025.

2.2.1.3 Armstrong (MSW) Phase C

Phase C has approximately 1,623,100 cubic yards of airspace available which will provide landfill capacity for approximately 13 years with capacity being reached in approximately 2038.

2.2.1.4 Armstrong (MSW) Phase D

The last Phase of the Armstrong Pit construction is Phase D with approximately 852,000 cubic yards of airspace. Phase D is anticipated to receive waste through 2044.

2.2.1.5 Lindsey (C&D) Phase I

Development of Phase I within the Lindsey C&D Landfill cell began in November of 2002 and continued to an approximate elevation of 5,500 feet. The available airspace of Phase I was approximated to be 75,000 cubic yards, providing just over 2 years of service.

2.2.1.6 Lindsey (C&D) Phase II

Phase II of the Lindsey Pit development will consist of C&D fill to an elevation of 5,600 feet. The available airspace of Phase II is projected to be 651,700 cubic yards, providing approximately 19 years of service being completed in 2023.

2.2.1.7 Lindsey (C&D) Phase III

Phase III of the Lindsey Pit development will consist of fill to an elevation of 5,700 feet msl. The available airspace of Phase III has been projected to be 1,651,000 cubic yards, providing approximately 28 years of service. Completion of Phase III is anticipated for the year 2051.

2.2.1.8 Lindsey (C&D) Phase IV

The last Phase of the Lindsey Pit is Phase IV. Phase IV will be comprised of C&D waste extending from the top of Phase III to the final contours as indicated on Drawing 3 (Appendix A). The available airspace of Phase IV has been estimated to be 6,436,000 cubic yards, providing approximately 43 years of service.

2.3 *DAILY, INTERMEDIATE AND FINAL COVER*

2.3.1 Daily and Intermediate Soil Cover

Daily cover soils must meet the 6-inch State requirements for protection against odors, litter and vectors in the Armstrong Pit. The daily 6-inch thick cover will typically be obtained from the excavation of the surrounding slopes and from previously milled materials.

Intermediate cover soil requirements are governed by R315-303-4. The outside face of the daily modules and waste areas that are expected to remain inactive for more than 30 days will be protected with an additional 12 inch intermediate cover. The borrow area for intermediate cover soils is the same for daily cover soils.

Before the start of waste placement each day, cover soils on top of the previous lift will be stripped back and stockpiled for reuse as soil cover at the end of the day or as needed. These recycled cover soils will be used first; the remainder of daily cover soils will be provided from cell excavation or stockpiled soils.

All C&D wastes deposited in the Lindsey Pit will receive soil cover no less than every 30 days.

2.3.2 Alternate Daily Cover

ICL has not historically utilized alternate daily cover materials. Due to the nature of the landfilling operation; ICL proposes to utilize the following alternative daily cover materials as the need arises:

- Wood chips – The wood chips created from the grinding of green waste as part of the green waste diversion process. ICL intends to recycle the wood chips back to the community as a landscaping product. Periodically, the timing of the wood chip sales may result in the generation of excess wood chips. These wood chips may be utilized as an alternative daily cover to minimize the size of the wood chip stockpile.

2.3.3 Final Cover

ICL will initiate the placement of the final cover system within 180 days after the disposal ceases in each of the closure phases. Final cover construction will be completed within 180 days after initiation.

The final cover system will consist (from the bottom up) of:

- Minimum of 18-inches of compacted site soils with a permeability of 1 x 10^{-5} cm/sec or less.
- A vegetation layer a minimum of 6 inches in depth.
- A layer of vegetation consisting of native grasses and shallow rooted shrubs.

The final cover system will minimize surface water infiltration (thereby minimizing leachate generation), gas migration, maintain slope stability, control surface water and erosion, and be capable of supporting vegetative cover. The vegetative cover has been selected with shallow root systems to prevent penetration into the soil matrix.

The final cover will be the same for both the Armstrong and the Lindsey Pits. The final cover will be constructed to the general contours as indicated on Drawings 3 & 5 (Appendix A).

2.4 MONITORING SYSTEM

2.4.1 Groundwater Monitoring System

The details of the ICL groundwater monitoring system are provided in the Groundwater and Leachate Monitoring Plan (Appendix E).

2.4.2 Leachate Monitoring

The details of the ICL leachate monitoring system are provided in the Groundwater and Leachate Monitoring Plan (Appendix E).

2.4.3 Landfill Gas

The decomposition of solid waste produces methane, a potentially flammable gas. The accumulation of methane in site structures can result in fire and explosions that can injure employees and property, users of the Landfill, and occupants of nearby structures. In accordance with Subtitle D and Utah rules, ICL will conduct surface and facility structure gas monitoring at least quarterly for methane detection. The concentration of methane gas generated by the Landfill must not exceed 25% of the lower explosive limit (LEL) in the facility structures (excluding gas control or recovery system components). The concentration of methane gas generated by the Landfill must not exceed the LEL at the facility boundary. As outlined in EPA Subtitle D, Subpart C and the State of Utah Regulations, ICL will take all necessary steps to protect human health and will immediately notify UDEQ of methane levels detected above required limits and actions taken, if any. Within 10 days of an incident, ICL will place documentation of the methane gas levels detected and a description of the interim steps taken to protect human health in the operating record. Within 60 days of detection, ICL personnel will implement a remediation plan for the methane gas releases, place a copy of the plan in the operating record, and notify UDEQ that the plan has been implemented. The remediation plan will describe the nature and extent of the problem and describe the proposed remedy.

2.5 DESIGN AND LOCATION OF RUN-ON/RUN-OFF CONTROL SYSTEMS

The main objectives of surface water management for the Landfill are; to provide landfill drainage and to prevent off site run-on, preventing unnecessary surface water infiltration and subsequent leachate production; to contain surface runoff from open areas on-site; and to prevent erosion. Federal regulations require: 1) A run-on control system to prevent flow onto the active portion of the landfill during the peak discharge from a 24-hour, 25-year storm; and 2) Run-off control system from the active portion of the landfill to collect and to control at least the water volume resulting from a 24-hour, 25-year storm.

2.5.1 Run-On from a 25-Year, 24-Hour Storm

The location of the site near the eastern base of the Granite Mountains will require that surface flows are diverted near the western boundary of the site. Diversion structures were designed to accommodate peak flows generated by a 25-year, 24-hour storm event. According to precipitation frequency data maintained by the National Oceanic and Atmospheric Administration (NOAA) anticipated rainfall for the design storm is 2.32 inches (2.89 inches for the 100-year 24-hour storm). Peak discharge was evaluated using the TR-55 graphical peak discharge method to be 115 cfs for the Armstrong Pit and 105 cfs for the Lindsey Pit. A rip-rap lined trapezoidal channel having a bottom width of 3-feet, 2H:1V side slopes and a total depth of 3.5-feet should contain the peak flows, leaving 1-1.3 feet of free-board. The required diversion channel was previously constructed uphill of both the Armstrong and Lindsey Pits. Drawings 2 and 7 (Appendix A) indicate the location and details of the run-on structures.

2.5.2 Run-Off from a 25-Year, 24-Hour Storm

As discussed previously the 25-year, 24-hour storm potential precipitation at the Landfill is 2.32 inches based on information from NOAA. After fill and grading of the final Landfill cell caps peak run-off will be approximately 25 and 36 cfs for the Armstrong and Lindsey Pits, respectively. Run-off will be controlled using trapezoidal drainage channels constructed around the perimeter of the landfill cells. The final cover surface of both the Armstrong & Lindsey Pits fill will be graded to the contours indicated on Drawings 3 and 5 (Appendix A). Drawings 3, 5, and 7 (Appendix A) indicate the location and details of the run-off structures.

SECTION 3 – CLOSURE PLAN

3.1 CLOSURE STRATEGY/SCHEDULE

This section describes the final cover construction, site capacity, schedule of closure implementation, estimated costs for closure, and final inspection procedures for the existing and future Phases at ICL.

The Executive Secretary will be notified in writing at least 60 days prior to the anticipated last receipt of waste in accordance with R315-302-3(4)(a). Implementation of the final closure Phase will begin within 30 days after last receipt of waste. Final closure of the entire Landfill will be completed within 180 days of implementation of closure activities, unless an extension has been granted by the Executive Secretary.

Closure will occur incrementally. Each Landfill Phase will be closed once it has been filled to design capacity. The following table summarizes by Landfill Phases the remaining Landfill capacity and projected dates of service starting from February 1 of 2005:

Landfill Phase	Phase Capacity (cubic yards)	Projected Date of Completion
Armstrong Phase A	Complete	---
Armstrong Phase B	2,100,325	2025
Armstrong Phase C	1,623,100	2039
Armstrong Phase D	852,000	2044
MSW TOTALS	**4,575,425**	
Lindsey Phase I	75,000	---
Lindsey Phase II	651,700	2023
Lindsey Phase III	1,651,000	2051
Lindsey Phase IV	6,436,000	2094
C&D TOTALS	**8,813,700**	

To estimate the landfill life and project the timing of constructed projects; engineering assumptions about the extent of each Phase were made to be able to calculate volumes. The length of time that each Phase will be in service will depend upon the day to day operation of the Landfill and will vary from the specific dates of closure presented above. It may be necessary, due to site access requirements, to partially fill future Phases to allow for final waste placement within a particular Phase.

3.2 FINAL COVER DESIGN AND INSTALLATION

A preliminary design package consisting of drawings, specifications, and QA/QC plan will be prepared and submitted to the State of Utah DSHW for review and approval prior to each cover placement event. A final closure certification package will be issued prior to final closure of the facility to ensure compliance with federal and state regulations effective at the time of closure. The conceptual final cover design described herein is in accordance with current State of Utah regulations and RCRA Subtitle D criteria. The final cover system is designed to control the emission of landfill gas, promote the establishment of vegetative cover, minimize infiltration and percolation of water into the waste, and minimize the erosion of the final cover soils throughout the post-closure care period and beyond. Drawings 3 and 5 (Appendix A) show the final topography for the Landfill.

As discussed previously, the final cover will consist of a minimum of 18" of 1x10-5 soils and an additional six-inch layer of topsoil. Cover slopes will not exceed a 4:1 maximum slope and have minimum slopes no less than 10:1.

3.3 SEED, FERTILIZER AND MULCH

The 6-inch vegetative layer of the cap will be seeded with a mixture of grasses suitable for fast growth in the region, then fertilized and mulched.

TRM's (turf reinforcement mats) will typically be placed in areas of concentrated runoff and/or drainage channels as necessary.

Early establishment of vegetation on the landfill's final slope surface will impede soil erosion and promote evapotranspiration. ICL will periodically evaluate vegetative growth, vigor, and color so that the integrity of the final cover system is maintained. If stress signs on vegetation caused by landfill gas and leachate seeps are noted, the problem will be corrected. Corrective procedures will be conducted based on current design recommendations and will be built consistent with construction specifications. ICL staff or a licensed landscape contractor will make repairs, as necessary.

3.4 LANDSCAPING

The Landfill facility, including all surrounding grounds, will be maintained in conjunction with any scheduled maintenance activities (i.e., road improvements, etc.). The landscape of the Landfill will be designed to be both functional and aesthetically pleasing.

3.5 FINAL COVER CONTOURS

The Landfill's final grades will be inspected and maintained in order to ensure its integrity and conformity with the conceptual final cover plans.

Any areas where water has collected (ponded) will be regraded. Erosion damage resulting from extremely heavy rainfall will be repaired. ICL staff will inspect the final grading no less than quarterly.

3.6 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

For construction of the final landfill cover, drawings, specifications and QA/QC procedures will be developed by a Utah licensed Professional Engineer and submitted to the State of Utah DSHW for review and approval prior to construction of each closure Phase.

3.7 CLOSURE COST ESTIMATES

The current cost estimates for the closure of the ICL operation is provided in Appendix I – Closure/Post Closure Costs.

3.8 CERTIFICATION OF CLOSURE AND RECORD KEEPING

A Utah licensed Professional Engineer will be retained to supervise closure of each of the closure Phases. The registered engineer will be employed by ICL, or will be a ICL-hired consultant and will certify the Landfill was closed according to the closure plan. Any amendment or deviation to the closure plan will be approved by the Executive Secretary and any associated permit modifications will be made. Final closure work and documentation will be observed and reviewed by DSHW personnel as necessary.

As part of the certification process, the engineer shall also provide closure as-built drawings to the Executive Secretary within 90 days following completion of closure activities.

Additionally, the final plats and the amount and location of waste will be recorded on the site title. The owner will file the notarized plat with the County Recorder within 60 days following certification of closure.

SECTION 4 – POST-CLOSURE CARE PLAN

4.1 MONITORING PROGRAM

Post closure activities will begin when closure is approved by the Executive Secretary. The following presents the post-closure plan for the ICL facility. The following subsections offer a description of the monitoring program, which includes groundwater monitoring, leachate and gas collection systems.

4.1.1 Groundwater Armstrong and Lindsey Pits

Groundwater is currently monitored in the Armstrong Pit as detailed in the approved Groundwater and Leachate Monitoring Plan (Appendix E). ICL will continue a groundwater monitoring program as required for the 30-year post-closure care period.

No groundwater monitoring is required or performed at the Lindsey Pit.

4.1.2 Surface Water

Although no surface water sampling activities are scheduled for the landfill, ICL staff will inspect the drainage system no less than quarterly. Temporary repairs to any observed damage will be made until permanent repairs can be scheduled. ICL or a licensed general contractor will replace drainage facilities, if necessary.

4.1.3 Leachate Collection and Treatment

4.1.3.1 Armstrong Pit

A leachate collection system was neither required nor installed during utilization of the unlined Landfill.

4.1.3.2 Lindsey Pit

A leachate collection system was neither required nor installed during utilization of the unlined Landfill.

4.1.4 Landfill Gas

Landfill gas monitoring wells have not been installed at the ICL site. Landfill gas is monitored at operator level around the site perimeter to monitor explosive landfill gas emissions from both the

Armstrong and Lindsey Pits. The perimeter of each Pit, as well as all structures at the site, will be monitored quarterly to ensure compliance with State regulations regarding explosive landfill gas.

During post-closure; ICL landfill personnel or a contracted company will be responsible for the gas observations at the facility perimeter and facility structures. Monitoring will occur no less often than quarterly and will be conducted more often if the need arises. In the event that a sample exceeds the regulatory level, ICL personnel will notify the DSHW immediately and undertake appropriate corrective actions.

As outlined in R315-303-3(5), ICL will take all the necessary steps to protect human health and will immediately notify UDEQ of explosive gas levels detected above allowable levels and actions to be taken. Also, within 7 days of incident, ICL will place in the operating record documentation of the explosive gas levels detected and a description of the interim steps taken to protect human health. Within 60 days of detection, ICL personnel will implement a remediation plan for the explosive gas releases, place a copy of the plan in the operating record, and notify UDEQ that the plan has been implemented. The remediation plan will describe the nature and extent of the problem and the proposed remedy.

4.2 MAINTENANCE PROGRAM

The following subsections offer a description of the maintenance of installed equipment, including groundwater monitoring systems and leachate and gas collection systems.

4.2.1 Monitoring Systems

4.2.1.1 Groundwater

All current and future groundwater monitoring wells will be inspected for signs of failure or deterioration during each sampling event. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to replace or repair the well. Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, sealing the annulus, or pumping and testing. If a well needs to be replaced, it will be properly abandoned. Damaged wells will be scheduled for repair or replacement.

4.2.1.2 Surface Water

Drainage control problems can result in accelerated erosion of a particular area within the Landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct storm water off-site.

Implementation of a post-closure maintenance program will maintain the integrity of the final drainage system throughout the post-closure maintenance period. The final surface water drainage system will be evaluated and inspected, no less than quarterly, for ponded water and blockage of, or damage to, drainage structures and swales. Where erosion problems are noted or drainage control structures need repair, proper maintenance procedures will be implemented as soon as site conditions permit so that further damage is prevented. Damaged drainage pipes and broken ditch linings will be removed and replaced.

ICL staff will inspect the drainage system no less than quarterly. Temporary repairs will be made until permanent repairs can be scheduled. ICL or a licensed general contractor will replace drainage facilities.

4.2.1.3 Leachate Collection and Treatment

No systems are installed; therefore no maintenance is required.

4.2.1.4 Landfill Gas

No systems are installed; therefore no maintenance is required.

4.2.1.5 Final Grading

The landfill cover final grade will be inspected no less than quarterly and maintained in order to preserve its integrity. Evaluation and inspection of the cover final grades will include evaluations of vegetation and overall system performance. At the completion of closure activities, the surface of the cover will be surveyed to provide a reference point for monitoring settlement.

Areas where water has collected (ponded) will be regraded. Erosion damage resulting from extremely heavy rainfall will be repaired.

4.2.2 Cover and Run-On/Run-Off Systems

The final cover system will incorporate features to manage storm water, minimize erosion, and provide for efficient removal of storm water. The constructed cap will convey collected water via earthen dikes, swales, and drainage channels away from the Landfill cover.

Placement of all permanent drainage facilities will be completed during, or immediately following, installation of the final soil cover.

4.3 SCHEDULE OF POST-CLOSURE ACTIVITIES

Post-closure activities, consisting of monitoring and maintaining the final cover and permanent drainage facilities, will be implemented periodically as areas of the Landfill are filled to final grade.

4.4 POST CLOSURE COST ESTIMATES

Updated cost estimates for post-closure care for the ICL facilities are presented in Appendix I – Closure/Post Closure Costs.

4.5 CHANGES TO RECORD OF TITLE, LAND USE, AND ZONING

ICL will notify the Iron County Recorder's Office at any such time when there is a change to the Record of Title, land use plan, or zoning restrictions. In addition, ICL will notify the Recorder at that time when the post-closure care period has expired.

4.6 POST CLOSURE FACILITY CONTACTS

For all post-closure care information; all contact will be through the Iron County Commission or a designee. Contact with Iron County officials will be at the following number:

Iron County Courthouse .... (435) 477-8300

4.7 POST CLOSURE LAND USE

Iron County will select an end use that will be limited to those that do not threaten the integrity of the existing control systems. All activities will be approved by the appropriate cities/agencies prior to implementation. Typical end uses range from recycling operations (which complement existing operations) to recreational activities. Since the closure of the first Landfill site may be nearly 40 years away, it is not currently possible to develop those land use plans to be consistent with surrounding land uses and the needs of the area that may be relevant at that future time.

SECTION 5 – FINANCIAL ASSURANCE

5.1 Closure Costs

Cost estimates have been developed for the closure Phases at ICL. Appendix I – Closure/Post-Closure Costs contains the most recent closure cost data for the ICL. Closure costs are updated each year and submitted with the Annual Report.

5.2 Post-Closure Care Costs

Cost estimates have been developed for the post-closure care period at ICL. Appendix I – Closure/Post-Closure Costs contains the most recent post-closure cost data for the ICL. Post-Closure costs are updated each year and submitted with the Annual Report.

5.3 Financial Assurance Mechanism

ICL maintains a closure account with the State Bank of Southern Utah. The Iron County Landfill Final Closure Account has approximately $300,000 to date. Iron County will continue to utilize the local governmental financial test to satisfy the financial assurance requirements. Iron County will continue to accrue funds at the State Bank of Southern Utah that may be utilized as an environmental contingency fund but is not intended to function as the facility financial assurance fund.

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APPENDIX A

Drawings

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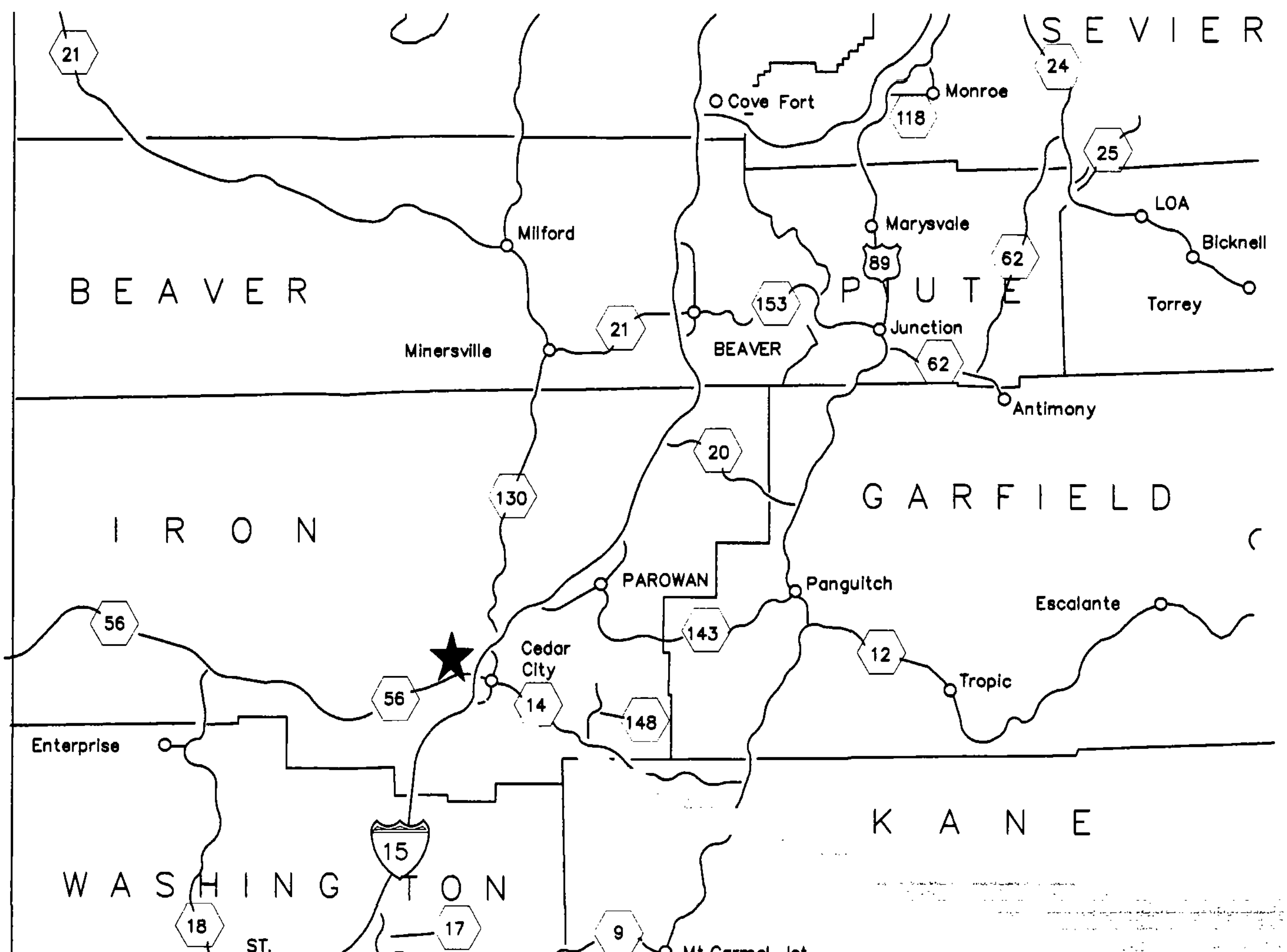
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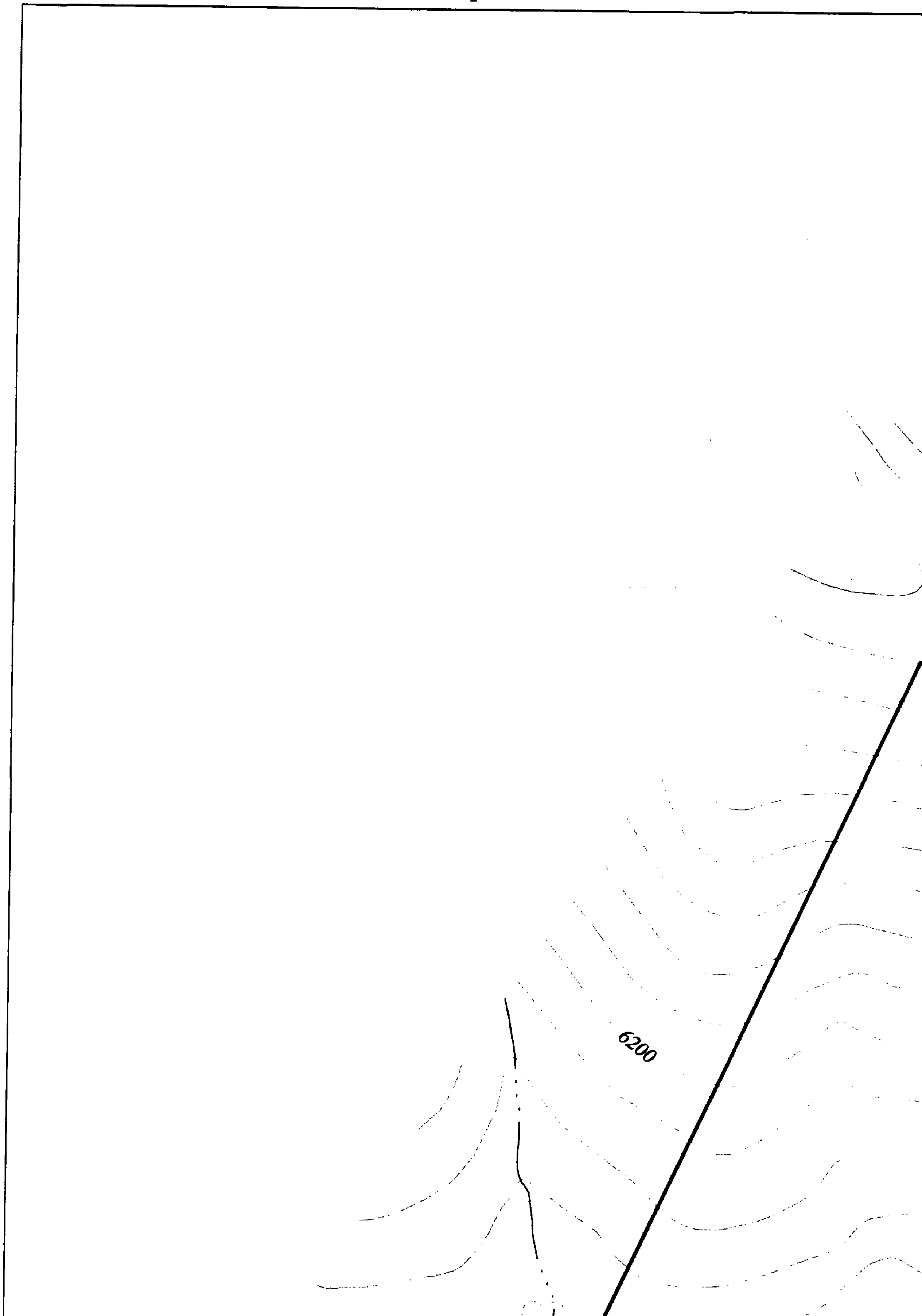

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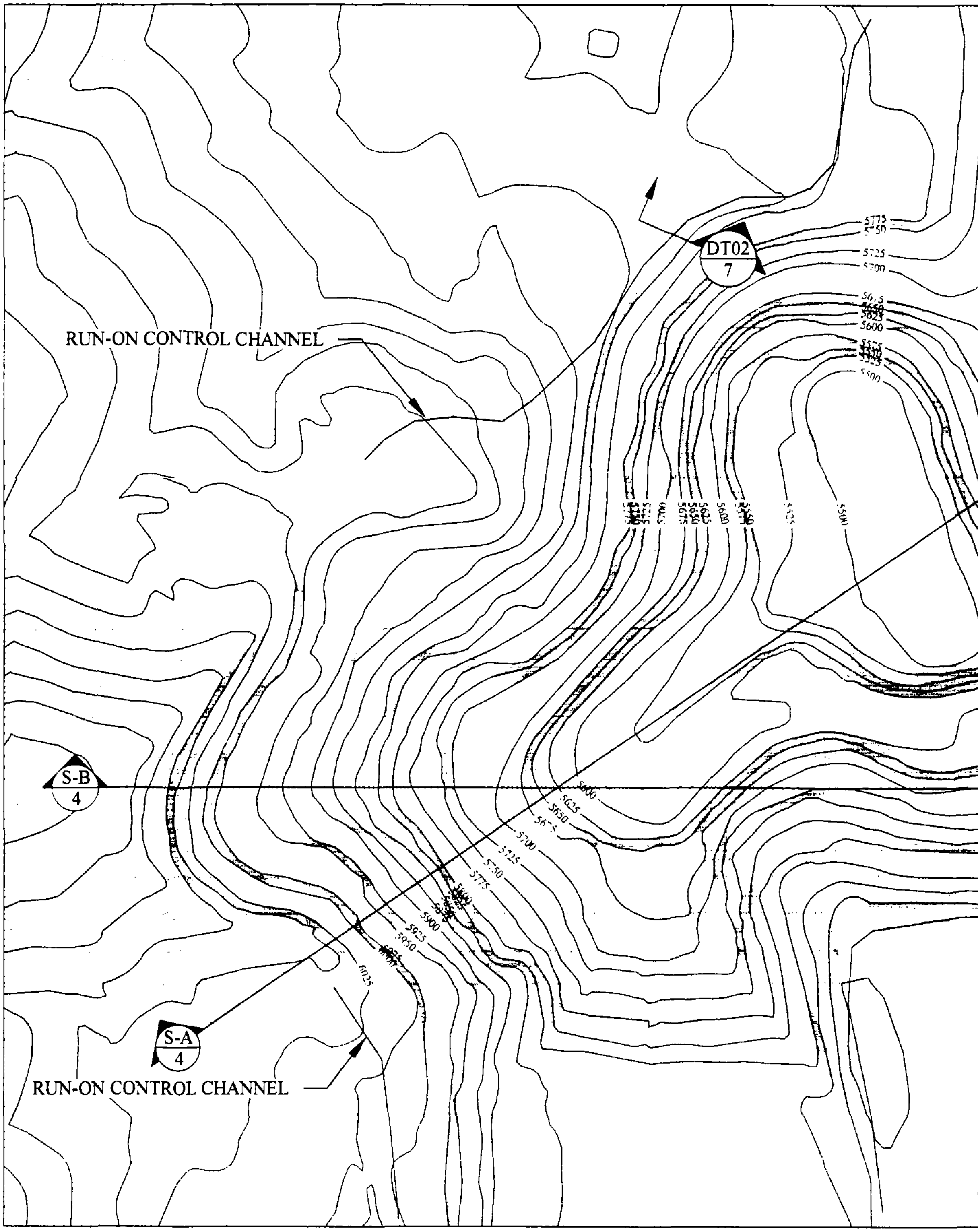
PHASE I - FILL TO 5500 FEET
AVAILABLE AIR SPACE ~ 75,000 C



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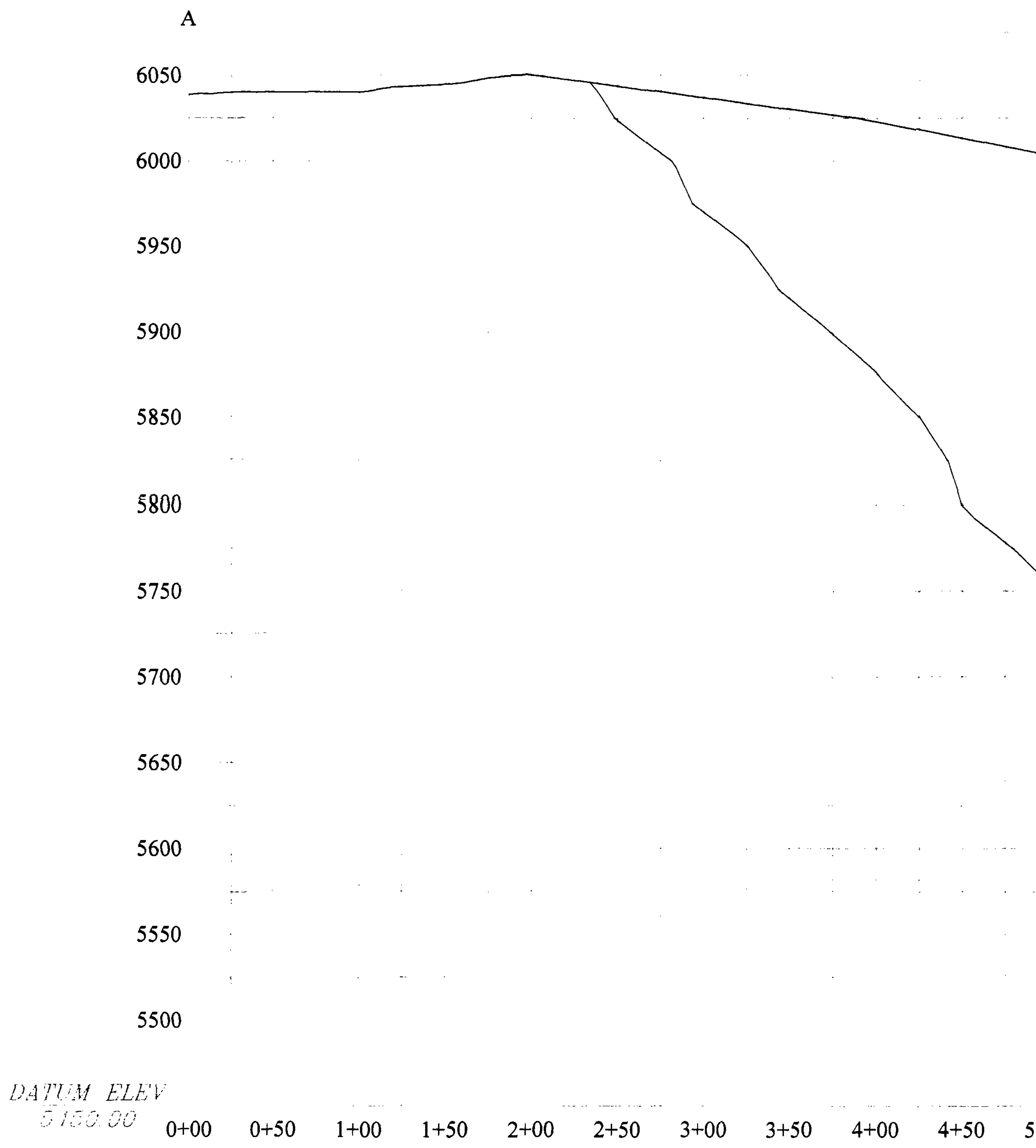
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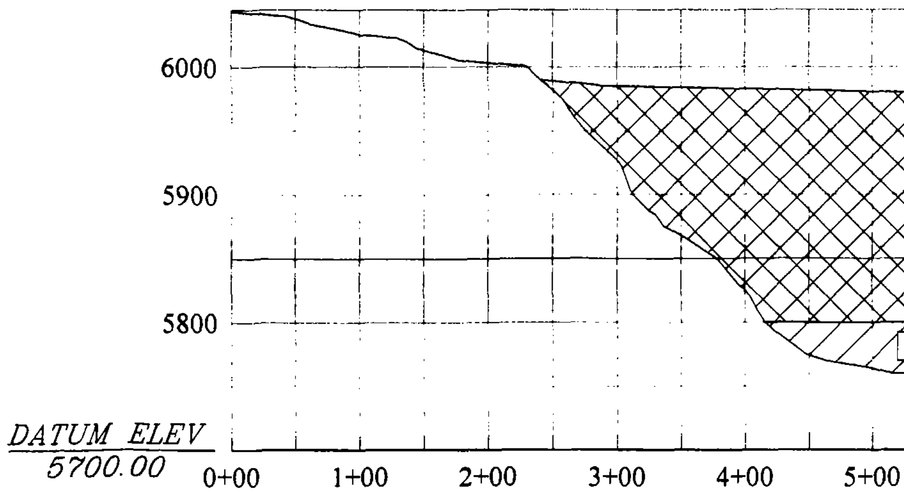

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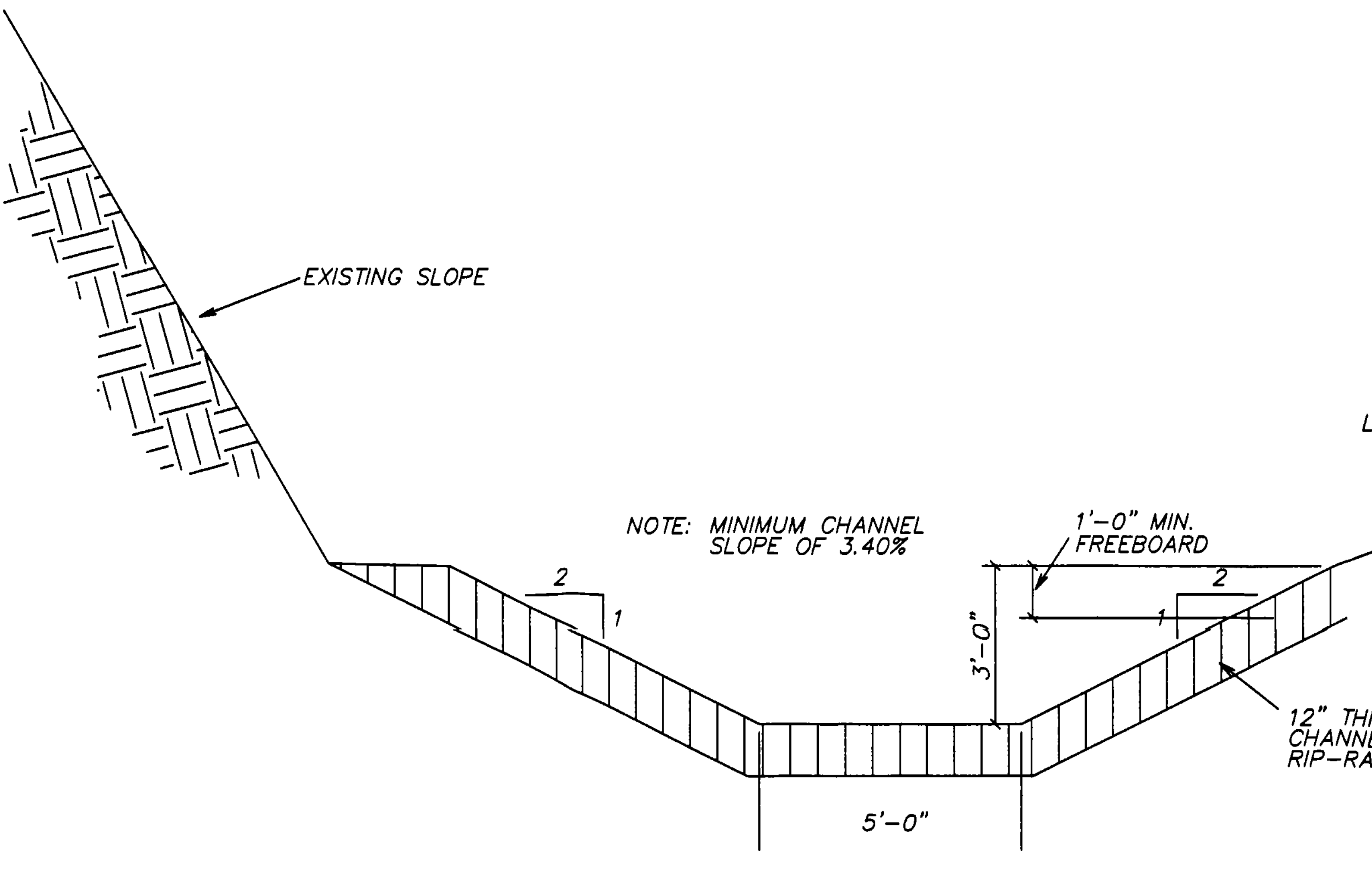

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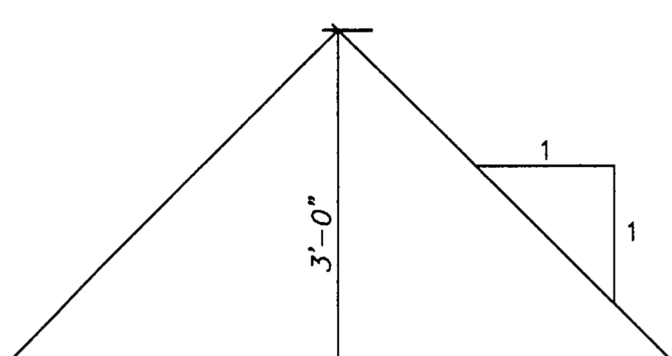

APPENDIX B

Legal Description & Proof of Ownership

COPY

0299521 BK 0416 PG 0561 - 0563
DIXIE B MATHESON - IRON COUNTY RECORDER
1990 JUN 14 14:34 PM FEE $.00 BY PJ
REQUEST: IRON COUNTY

QUITCLAIM DEED

USX CORPORATION (successor to United States Steel Corporation), a Delaware corporation ("USX"), with an office at 600 Grant Street, Pittsburgh, Pennsylvania 15219-4776, hereby quitclaims to IRON COUNTY, UTAH, a body corporate and politic existing pursuant to the laws of the State of Utah ("County"), the following described patented lode mining claims, situate in the Iron Springs Mining District, in Iron County, State of Utah, to wit:

LINDSAY LODE MINING CLAIM	U.S. LOT NO. 53
WANDERER LODE MINING CLAIM	U.S. LOT NO. 54
LITTLE ALLIE LODE MINING CLAIM	U.S. LOT NO. 48
CORA #1 LODE MINING CLAIM	U.S. LOT NO. 4797
BELGUIM LODE MINING CLAIM	U.S. LOT NO. 6725

Together with all and singular the mines, minerals, lodes and veins within the lines of said claims, and their dips and spurs and all dumps.

County, for itself and its successors and assigns, by its acceptance of this Deed, accepts said mining claims in their current condition "as is" and does hereby assume and agree to perform all of the obligations and satisfy all of the liabilities of USX with respect to the said mining claims, whether existing under contract or other agreement or under federal, state or local law or regulations and, with respect to such laws or regulations, whether now existing or hereafter arising, including, but not limited to, any reclaimation, reforesting, restoration of natural grade, removing or otherwise dealing with hazardous materials of whatever sort, and waives any right of action which it may now or hereafter have to recover against USX any costs in connection with any of the foregoing, including, but not limited to, any right under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended.

USX hereby represents and warrants to County that USX has no knowledge of (i) any existing obligation to reclaim, reforest or restore the above-described mining claims, whether pursuant to contract or agreement or federal, state or local law, including, but not limited to, the Surface Mining Control and Reclamation Act, and (ii) the presence on said mining claims of any hazardous material. The foregoing representation and warranty shall be for the benefit of County only and shall not inure to the benefit of the successors or assigns of County.

IN WITNESS WHEREOF, USX Corporation has executed these presents this 17th day of November, 1989.

USX CORPORATION

ATTEST:

Assistant Secretary

BY

General Manager-Administration & Group Comptroller

COMMONWEALTH OF PENNSYLVANIA)
) ss.
COUNTY OF ALLEGHENY)

THIS IS TO CERTIFY that on the 17th day of November, 1989, before me, the undersigned, a Notary Public in and for

0299521 Bk 0416 Pg 0562

COPY

the Commonwealth of Pennsylvania, duly commissioned and sworn, personally appeared C. J. Navetta & R. M. Stanton, as General Manager-Admin.&Group Comptroller and Assistant Sect'y. of USX Corporation, with authority to sign on its behalf, to me known and known to me to be the individual mentioned in and who executed the within and foregoing, and he acknowledged to me that he signed and sealed the same as the free and voluntary act and deed of said company, for the uses and purposes therein specified.

WITNESS my hand and notarial seal hereto affixed the day and year first hereinabove written.

Lois A. Witt

Notary Public in and for
the Commonwealth of Pennsylvania
My Commission Expires on

NOTARIAL SEAL
LOIS A. WITT, Notary Public
Pittsburgh, Allegheny County, PA
My Commission Expires October 18,1990

APPENDIX C

Landfill Forms

IRON COUNTY LANDFILL

RANDOM LOAD INSPECTION RECORD

INSPECTION INFORMATION	
INSPECTOR'S NAME:	
DATE OF INSPECTION:	
TIME OF INSPECTION:	
FACILITY NAME:	
TRANSPORTATION COMPANY INFORMATION	
COMPANY NAME:	
ADDRESS:	
PHONE NUMBER:	
VEHICLE INFORMATION	
DRIVER'S NAME:	
VEHICLE TYPE:	
VEHICLE LICENSE NUMBER:	
VEHICLE CONTENTS:	☐ HOUSEHOLD ☐ COMMERCIAL ☐ OTHER ______
OBERVATIONS AND ACTIONS TAKEN	

INSPECTOR'S SIGNATURE:________________________ DATE:________________

I CERTIFY THAT THIS LOAD CONTAINS NO HAZARDOUS WASTES AND IF ANY ARE FOUND IN THIS INSPECTION THAT I OR COMPANY WILL DISPOSE OF SUCH ACCORDING TO STATE AND FEDERAL LAW.

SIGNATURE.____

IRON COUNTY LANDFILL
INSPECTION FORM

PERFORMED BY:______________________ DATE:______________________

	OVERALL CONDITION	
	SATISFACTORY	NEEDS WORK
1. STRUCTURES AND ROADS		
1. BUILDINGS	________	________
2. FENCES	________	________
3. GATES	________	________
4. ROADS	________	________

SPECIFY RECOMMENDED REPAIRS AND/OR LIST ACTIONS TAKEN:

____

____

	SATISFACTORY	NEEDS WORK
2. OPERATIONS		
1. LITTER AND WEED	________	________
2. EXCAVATIONS	________	________
3. DAILY COVER	________	________
4. FINAL COVER	________	________
5. SEGREGATED WASTE		
A. SCRAP METAL	________	________
B. APPLIANCES	________	________
C. DEAD ANIMAL PIT	________	________
D. USED BATTERY SKID	________	________
E. TREE LIMB/PALLETS	________	________

SPECIFY RECOMMENDED REPAIRS AND/OR LIST ACTIONS TAKEN:

____

____

____

IRON COUNTY LANDFILL
RANDOM LOAD INSPECTION RECORD
MSW LANDFILL

INSPECTION INFORMATION	
Inspector's Name:	
Date of Inspection:	
Time of Inspection:	
Facility Name:	
TRANSPORTATION COMPANY INFORMATION	
Company Name:	
Address:	
Phone Number:	
VEHICLE INFORMATION	
Driver's Name:	
Vehicle Type:	
Vehicle License Number:	
Vehicle Contents:	☐ HOUSEHOLD ☐ COMMERCIAL ☐ OTHER ______
OBSERVATIONS AND ACTIONS TAKEN	

Photo Documentation: ______ Yes ______ No

Inspector's Signature ______________________________ Date ______________

Driver's Signature ______________________________ Date ______________

Driver's Signature hereon denotes: His presence during the inspection and does not admit, confirm, or identify liability.

IRON COUNTY LANDFILL
RANDOM LOAD INSPECTION RECORD
C & D LANDFILL

INSPECTION INFORMATION	
Inspector's Name:	
Date of Inspection:	
Time of Inspection:	
Facility Name:	
TRANSPORTATION COMPANY INFORMATION	
Company Name:	
Address:	
Phone Number:	
VEHICLE INFORMATION	
Driver's Name:	
Vehicle Type:	
Vehicle License Number:	
Vehicle Contents:	☐ HOUSEHOLD ☐ COMMERCIAL ☐ OTHER ______
OBSERVATIONS AND ACTIONS TAKEN	

Photo Documentation: ______ Yes ______ No

Inspector's Signature ______________________________ Date ______________

Driver's Signature ______________________________ Date ______________

Driver's Signature hereon denotes: His presence during the inspection and does not admit, confirm, or identify liability.

APPENDIX D

Landfill Life

ARMSTRONG PIT OPERATIONAL LIFE (2.5% Annual Growth)

ACTIVE PHASE	YEAR	ESTIMATED DAILY MSW WASTE (Tons)	DAYS OF OPERATION	ESTIMATED YEARLY MSW WASTE (Tons)	ESTIMATED YEARLY MSW WASTE (Cu. Yds.)	CUMULATIVE MSW WASTE (Cubic Yards)	REMAINING MSW (NET) CAPACITY (Cu. Yds.)
							3,718,819
A	1994	94	310	29,074	48,554	48,554	3,670,264
A	1995	96	310	29,820	49,799	98,354	3,620,465
A	1996	99	310	30,585	51,076	149,430	3,569,389
A	1997	101	310	31,369	52,386	201,816	3,517,003
A	1998	104	310	32,173	53,729	255,545	3,463,274
B	1999	106	310	32,998	55,107	310,651	3,408,167
B	2000	109	310	33,844	56,520	367,171	3,351,648
B	2001	112	310	34,712	57,969	425,140	3,293,679
B	2002	115	310	35,602	59,455	484,595	3,234,223
B	2003	86	310	26,658	44,520	529,115	3,189,704
B	2004	88	310	27,342	45,661	574,776	3,144,043
B	2005	90	310	28,026	46,803	621,579	3,097,240
B	2006	93	310	28,726	47,973	669,551	3,049,267
B	2007	95	310	29,444	49,172	718,724	3,000,095
B	2008	97	310	30,180	50,401	769,125	2,949,694
B	2009	100	310	30,935	51,661	820,786	2,898,032
B	2010	102	310	31,708	52,953	873,739	2,845,080
B	2011	105	310	32,501	54,277	928,016	2,790,803
B	2012	107	310	33,314	55,634	983,650	2,735,169
B	2013	110	310	34,146	57,025	1,040,674	2,678,145
B	2014	113	310	35,000	58,450	1,099,124	2,619,695
B	2015	116	310	35,875	59,911	1,159,036	2,559,783
B	2016	119	310	36,772	61,409	1,220,445	2,498,374
B	2017	122	310	37,691	62,944	1,283,389	2,435,430
B	2018	125	310	38,634	64,518	1,347,907	2,370,912
B	2019	128	310	39,599	66,131	1,414,038	2,304,781
B	2020	131	310	40,589	67,784	1,481,822	2,236,996
B	2021	134	310	41,604	69,479	1,551,301	2,167,518
B	2022	138	310	42,644	71,216	1,622,517	2,096,302
B	2023	141	310	43,710	72,996	1,695,513	2,023,306
B	2024	145	310	44,803	74,821	1,770,334	1,948,485
B	2025	148	310	45,923	76,692	1,847,026	1,871,793
C	2026	152	310	47,071	78,609	1,925,635	1,793,184
C	2027	156	310	48,248	80,574	2,006,209	1,712,610
C	2028	160	310	49,454	82,588	2,088,797	1,630,021
C	2029	164	310	50,691	84,653	2,173,451	1,545,368
C	2030	168	310	51,958	86,770	2,260,220	1,458,599
C	2031	172	310	53,257	88,939	2,349,159	1,369,660
C	2032	176	310	54,588	91,162	2,440,321	1,278,498
C	2033	180	310	55,953	93,441	2,533,762	1,185,056
C	2034	185	310	57,352	95,777	2,629,540	1,089,279
C	2035	190	310	58,785	98,172	2,727,712	991,107
C	2036	194	310	60,255	100,626	2,828,338	890,481
C	2037	199	310	61,762	103,142	2,931,479	787,339
C	2038	204	310	63,306	105,720	3,037,200	681,619
D	2039	209	310	64,888	108,363	3,145,563	573,256
D	2040	215	310	66,510	111,072	3,256,635	462,184
D	2041	220	310	68,173	113,849	3,370,484	348,335
D	2042	225	310	69,877	116,695	3,487,180	231,639
D	2043	231	310	71,624	119,613	3,606,792	112,026
D	2044	237	310	73,415	122,603	3,729,395	-10,577
				2,080,150			

Approximate Gross Air Space (Cubic Yards) = 4,958,425
Net Air Space based upon a 25% reduction to allow for cover soils
Approximate Net Air Space (Cubic Yards) = 3,718,819
Conversion of tons of waste to Cubic Yards of waste is based upon an estimated conversion rate of 1,200 pounds per one Cubic Yard of MSW waste.
1994 to 2003 waste stream includes C&D waste

LINDSEY PIT OPERATIONAL LIFE (2.5% Annual Growth)

ACTIVE PHASE	YEAR	ESTIMATED DAILY C&D WASTE (Tons)	DAYS OF OPERATION	ESTIMATED YEARLY C&D WASTE (Tons)	ESTIMATED YEARLY C&D WASTE (Cu. Yds.)	CUMULATIVE C&D WASTE (Cubic Yards)	REMAINING LANDFILL CAPACITY (Cu. Yds.)
I	2002	31	40	1,224	2,448	2,448	6,609,750
I	2003	31	310	9,486	18,972	21,420	6,590,778
I	2004	31	310	9,723	19,446	40,866	6,571,332
II	2005	32	310	9,966	19,932	60,799	6,551,399
II	2006	33	310	10,215	20,431	81,230	6,530,968
II	2007	34	310	10,471	20,942	102,171	6,510,027
II	2008	35	310	10,733	21,465	123,636	6,488,562
II	2009	35	310	11,001	22,002	145,638	6,466,560
II	2010	36	310	11,276	22,552	168,190	6,444,008
II	2011	37	310	11,558	23,116	191,305	6,420,893
II	2012	38	310	11,847	23,693	214,999	6,397,199
II	2013	39	310	12,143	24,286	239,284	6,372,914
II	2014	40	310	12,446	24,893	264,177	6,348,021
II	2015	41	310	12,758	25,515	289,692	6,322,506
II	2016	42	310	13,077	26,153	315,846	6,296,352
II	2017	43	310	13,403	26,807	342,653	6,269,545
II	2018	44	310	13,739	27,477	370,130	6,242,068
II	2019	45	310	14,082	28,164	398,294	6,213,904
II	2020	47	310	14,434	28,868	427,162	6,185,036
II	2021	48	310	14,795	29,590	456,752	6,155,446
II	2022	49	310	15,165	30,330	487,081	6,125,117
II	2023	50	310	15,544	31,088	518,169	6,094,029
III	2024	51	310	15,933	31,865	550,034	6,062,164
III	2025	53	310	16,331	32,662	582,696	6,029,502
III	2026	54	310	16,739	33,478	616,174	5,996,024
III	2027	55	310	17,158	34,315	650,489	5,961,709
III	2028	57	310	17,587	35,173	685,662	5,926,536
III	2029	58	310	18,026	36,052	721,714	5,890,484
III	2030	60	310	18,477	36,954	758,668	5,853,530
III	2031	61	310	18,939	37,878	796,546	5,815,652
III	2032	63	310	19,412	38,824	835,370	5,776,828
III	2033	64	310	19,898	39,795	875,165	5,737,033
III	2034	66	310	20,395	40,790	915,955	5,696,243
III	2035	67	310	20,905	41,810	957,765	5,654,433
III	2036	69	310	21,427	42,855	1,000,620	5,611,578
III	2037	71	310	21,963	43,926	1,044,546	5,567,652
III	2038	73	310	22,512	45,024	1,089,570	5,522,628
III	2039	74	310	23,075	46,150	1,135,720	5,476,478
III	2040	76	310	23,652	47,304	1,183,024	5,429,174
III	2041	78	310	24,243	48,486	1,231,511	5,380,687
III	2042	80	310	24,849	49,699	1,281,209	5,330,989
III	2043	82	310	25,471	50,941	1,332,150	5,280,048
III	2044	84	310	26,107	52,215	1,384,365	5,227,833
III	2045	86	310	26,760	53,520	1,437,885	5,174,313
III	2046	88	310	27,429	54,858	1,492,743	5,119,455
III	2047	91	310	28,115	56,229	1,548,972	5,063,226
III	2048	93	310	28,818	57,635	1,606,607	5,005,591
III	2049	95	310	29,538	59,076	1,665,683	4,946,515
III	2050	98	310	30,276	60,553	1,726,236	4,885,962
III	2051	100	310	31,033	62,067	1,788,303	4,823,895
IV	2052	103	310	31,809	63,618	1,851,921	4,760,277
IV	2053	105	310	32,604	65,209	1,917,130	4,695,068
IV	2054	108	310	33,420	66,839	1,983,969	4,628,229

LINDSEY PIT OPERATIONAL LIFE (2.5% Annual Growth)

ACTIVE PHASE	YEAR	ESTIMATED DAILY C&D WASTE (Tons)	DAYS OF OPERATION	ESTIMATED YEARLY C&D WASTE (Tons)	ESTIMATED YEARLY C&D WASTE (Cu. Yds.)	CUMULATIVE C&D WASTE (Cubic Yards)	REMAINING LANDFILL CAPACITY (Cu. Yds.)
IV	2055	111	310	34,255	68,510	2,052,479	4,559,719
IV	2056	113	310	35,111	70,223	2,122,702	4,489,496
IV	2057	116	310	35,989	71,978	2,194,680	4,417,518
IV	2058	119	310	36,889	73,778	2,268,458	4,343,740
IV	2059	122	310	37,811	75,622	2,344,080	4,268,118
IV	2060	125	310	38,756	77,513	2,421,593	4,190,605
IV	2061	128	310	39,725	79,451	2,501,044	4,111,154
IV	2062	131	310	40,718	81,437	2,582,480	4,029,718
IV	2063	135	310	41,736	83,473	2,665,953	3,946,245
IV	2064	138	310	42,780	85,560	2,751,513	3,860,685
IV	2065	141	310	43,849	87,699	2,839,212	3,772,986
IV	2066	145	310	44,946	89,891	2,929,103	3,683,095
IV	2067	149	310	46,069	92,138	3,021,241	3,590,957
IV	2068	152	310	47,221	94,442	3,115,683	3,496,515
IV	2069	156	310	48,401	96,803	3,212,486	3,399,712
IV	2070	160	310	49,611	99,223	3,311,709	3,300,489
IV	2071	164	310	50,852	101,704	3,413,412	3,198,786
IV	2072	168	310	52,123	104,246	3,517,658	3,094,540
IV	2073	172	310	53,426	106,852	3,624,510	2,987,688
IV	2074	177	310	54,762	109,524	3,734,034	2,878,164
IV	2075	181	310	56,131	112,262	3,846,296	2,765,902
IV	2076	186	310	57,534	115,068	3,961,364	2,650,834
IV	2077	190	310	58,972	117,945	4,079,309	2,532,889
IV	2078	195	310	60,447	120,894	4,200,202	2,411,996
IV	2079	200	310	61,958	123,916	4,324,118	2,288,080
IV	2080	205	310	63,507	127,014	4,451,132	2,161,066
IV	2081	210	310	65,095	130,189	4,581,321	2,030,877
IV	2082	215	310	66,722	133,444	4,714,765	1,897,433
IV	2083	221	310	68,390	136,780	4,851,545	1,760,653
IV	2084	226	310	70,100	140,199	4,991,744	1,620,454
IV	2085	232	310	71,852	143,704	5,135,449	1,476,749
IV	2086	238	310	73,649	147,297	5,282,746	1,329,452
IV	2087	244	310	75,490	150,979	5,433,725	1,178,473
IV	2088	250	310	77,377	154,754	5,588,479	1,023,719
IV	2089	256	310	79,311	158,623	5,747,102	865,096
IV	2090	262	310	81,294	162,588	5,909,690	702,508
IV	2091	269	310	83,327	166,653	6,076,343	535,855
IV	2092	276	310	85,410	170,819	6,247,162	365,036
IV	2093	282	310	87,545	175,090	6,422,252	189,946
IV	2094	289	310	89,734	179,467	6,601,719	10,479
				3,300,860	6,601,719		

Approximate Gross Air Space (Cubic Yards) = 8,813,000

Net Air Space based upon a 25% reduction to allow for cover soils

Approximate Net Air Space (Cubic Yards) = 6,609,750

Conversion of tons of waste to Cubic Yards of waste is based upon an estimated conversion rate of 1,000 pounds per one Cubic Yard of C&D waste.

AIR QUALITY SIZE CUTOFF

2.5 million MG of MSW permitted
2.5 million cubic meters
@ 1.102 tons per MG

2.5 million MG equals 2.76 million tons of permitted MSW capacity

IRON COUNTY LANDFILL PERMITTED CAPACITY

4.96 million cubic yards of total capacity (MSW and soil)

@ 25% soil use

4.96 million cubic yards is reduced to 3.72 million cubic yards available for MSW

3.72 million cubic yards is converted to tons by the ratio of 1200 lbs/cubic yard
or .6 tons per cubic yard
3.72 million cubic yards multiplied by .6 tons per cubic yard equals 2.23 million tons of permitted MSW capacity

Iron County Landfill is approximately 500,000 tons below the air quality size criteria.

APPENDIX E

Groundwater and Leachate Monitoring Plan

GROUNDWATER AND LEACHATE MONITORING PLAN

AT

IRON COUNTY MUNICIPAL LANDFILL
ARMSTRONG PIT
IRON COUNTY, UTAH

MAY 1999

GROUNDWATER AND LEACHATE MONITORING PLAN

AT

IRON COUNTY MUNICIPAL LANDFILL
ARMSTRONG PIT
IRON COUNTY, UTAH

Prepared for

IRON COUNTY SOLID WASTE
3127 N Iron Springs Road
Cedar City, Utah 84720

Prepared By

BINGHAM ENVIRONMENTAL, INC.
5160 Wiley Post Way
Salt Lake City, Utah 84116

May 5, 1999

GROUNDWATER AND LEACHATE MONITORING PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

SECTION ONE

INTRODUCTION

1.1 GENERAL

The Iron County Municipal Landfill (Armstrong Pit) is a Class I noncommercial municipal solid waste (MSW) landfill owned and operated by Iron County. It is a solid waste disposal facility for both communities and unincorporated areas of Iron County. The landfill is located west of Cedar City in Township 35 South, Range 12 West, Section 32 in an abandoned open pit iron mine on the east slope of Granite Mountain near Iron Springs. The Armstrong Pit began accepting solid waste in September of 1994 and has a design capacity of 4.2 million cubic yards.

This Groundwater and Leachate Monitoring Plan provides specific details on procedures and methods that will be used in the field and laboratory to meet project objectives for data quality of all groundwater monitoring required under R315-308-2. Specific statistical methods to be used in determining whether a significant change has occurred as compared to background will consist of the control chart approach. This Plan also provides procedures for sampling the collection (pan) lysimeter located within the Landfill.

1.2 HYDROGEOLOGY

The geology and hydrogeology of this site has been studied for many years by government agencies and mining companies. Previous work at Granite Mountain was compiled by MacKin, Nelson, and Rowley (1976) and was fully detailed by Tahoma Resources (1990) in the last application.

The geology of the Iron Spring district, which contains the landfill, is complex. The area is in the transition zone between the Colorado Plateau and the Basin and Range provinces, and has been structurally active since at least early Cretaceous time. This activity has created several faults which influence the aquifers in the area. These faults create fault controlled aquitards separating the bedrock mountains from the alluvial aquifers. For example, the Blowout Pit, on the south flank of Iron Mountain has filled with water to approximately 6,275 feet above sea level while a water well five miles north of the Blowout Pit has static level of 5,120 feet above sea level; 1,155 feet lower than the water level at Blowout Pit. The water well pump tests showed no significant drawdown indicating a highly transmissive alluvial aquifer. The apparent difference between the two water levels is the presence of the Eight Mile Pass Fault Zone, located between them.

At the landfill site, bedrock is exposed at the surface indicating the shallowest zones of groundwater occur in fractured quartz monzonite and sedimentary rocks. These bedrock aquifers have been explored by drilling. The drilling indicated that at the landfill site, approximately 50 feet of iron ore is present at the surface of the pit bottom followed by a fault gouge encountered for the next 15 feet. Immediately beneath the fault is a confined aquifer in quartzite and sandstone. This aquifer is present through the site, however, it seems likely fault aquitards isolate sections from communicating one with another. The Cory-Armstrong and Eight Mile Pass fault zones act as aquitards between the bedrock aquifer at the site and the potable water supply in Cedar City.

The alluvial aquifer nearest to the site is the Iron Spring Creek water table aquifer. This aquifer appears to be perched above the bedrock aquifers present at the site, and is distinctly different chemically, indicating the two aquifers are not interconnected..

SECTION TWO

GROUNDWATER MONITORING NETWORK AND LEACHATE MONITORING LYSIMETER

2.1 MONITOR WELL NETWORK

The approved compliance monitor well network at the Iron County Municipal Landfill consists of three (3) monitoring wells identified as BH-2, BH-5 and BH-7. Locations of the wells are shown on Figure 1. Monitoring well completion details and survey information for the compliance monitor wells are summarized in Tables 1 and 2 respectively. Details of the monitor wells are provided in Attachment 1.

Table 1

MONITOR WELL COMPLETION DETAILS
Iron County Municipal Landfill

Well ID	Elevation Above Mean Sea Level (feet)			
	Screen		Pump Intake	Groundwater (Mar. 1998)
	Top	Bottom		
BH-2	5,352.68	5,332.68	5,343.18	5,387.98
BH-5	5,464.03*	5,444.03*	5,449.13	5,483.03
BH-7	5,453.72*	5,433.72*	5,438.72	5,482.72

* Estimated based on reported well specifications

Table 2

SUMMARY OF MONITOR WELL LOCATIONS AND ELEVATIONS
Iron County Municipal Landfill

Well ID	Northing (feet)	Easting (feet)	Elevation Ground Surface (feet)
BH-2	12,072.6	9,636.6	5,652.18
BH-5	10,703.4	8,707.9	5,857.03
BH-7	8,665.1	8,186.0	5,923.72

2.2 COLLECTION LYSIMETER

A collection (pan) lysimeter was installed at the base of the Landfill, at the location shown in Figure 1, prior to waste placement. Details of the pan lysimeter are provided in Attachment 1. The lysimeter stand pipe will continue to be extended vertically as MSW is placed in the Landfill to provide access for monitoring throughout the life of the Landfill.

The lysimeter will be monitored to determine leachate generation rates, leachate quality, and potential for impact to groundwater and is not considered a point of compliance in the groundwater monitoring network.

SECTION THREE

GROUNDWATER SAMPLING PROCEDURES

The following subsections detail specific sampling techniques and methodology to be used during all groundwater monitoring to provide consistent quality groundwater data. Sampling personnel must have a copy of the approved Groundwater and Leachate Monitoring Plan in the field during each groundwater sampling event. Groundwater monitoring network wells are required to be sampled semi-annually according to R315-308-2(4)(b) after background levels are established. The pan lysimeter will also be sampled during the semi-annual groundwater sampling events as described in Section Four of this Plan.

3.1 GENERAL

The sampling procedures consist of obtaining groundwater samples from the compliance monitor wells, identified in Section 2.1, utilizing a dedicated bladder pump system and micro-purging techniques. Coordination for conducting the sampling events will be established prior to sampling. Sampling equipment will be prepared and properly calibrated prior to sampling each monitor well. All information obtained in the field shall be recorded on a Groundwater Monitoring Data Sheet, similar to the one presented in Attachment 2.

Upon arrival at a well, the condition of each of the monitor wells will be observed and noted on the field data sheet, i.e., that the wells are secured with a lock, that the apron is intact, and the outer casing is in good repair. Any required repairs will be noted on the field sampling sheets.

The monitor wells shall be sampled using currently accepted and approved technology or approved equivalent techniques. Groundwater sampling will be performed by competent personnel who are familiar with proper sampling techniques and health and safety procedures. Groundwater samplers should also be knowledgeable in techniques of well purging, sample collection and preservation, decontamination, and quality assurance/quality control (QA/QC). The sampler will wear a new pair of latex gloves at each well for handling sampling equipment and containers.

3.2 WATER LEVEL MEASUREMENTS

A special cap is installed on the protective casing of each well for installation of the dedicated bladder pump. Water levels will be taken through the access hole in the cap and the depth to groundwater measured from the top of the cap. An air line may be installed alongside the dedicated bladder pump to obtain depth to groundwater measurements. The elevations of the caps will be determined by a registered engineer or licensed surveyor and reported to the nearest 0.01 foot. Prior to and sampling, water level readings must be obtained using a conductivity-based water level indicator or equivalent instrument capable of obtaining measurements to the nearest

0.01 feet. The probe will be decontaminated between use at each well by washing with a non-phosphate detergent and rinsing three times with deionized or distilled water. The probe will then be lowered into the well casing until the level indicator alarm sounds or light goes on. The depth to water is read from the top of the cap to the nearest 0.01 foot. This measurement will be repeated until two consecutive readings agree to the nearest 0.01 foot. The depth to groundwater will be recorded immediately on the Groundwater Monitoring Data Sheet to the nearest 0.01 feet. Water levels should be measured every 5 minutes or every 5 pump cycles during purging to monitor for excessive drawdown. The pumping rate should be decreased if the water level drops more than 0.2 feet below the initial water level measurement. The water level should also be taken post sampling just prior to turning off the pump to determine if pumping has created excessive drawdown and adjustment of pumping rates are necessary.

3.3 WELL MICROPURGING

Prior to sampling, the wells will be purged, using micro-purging techniques, to ensure the groundwater sample is representative of formation water. The pump controller will be attached to the pump air supply line. The oil-less compressor, if used, should be located downwind and away from the well, to minimize the potential for sample contamination from exhaust gases. Compressed gas may be used and the air supply line attached to the pump controller. The pump should be started and adjusted to a discharge rate at or below 0.5 liters per minute. The groundwater which is being discharged from the well should be monitored for specific conductance, dissolved oxygen, temperature, and pH. All four parameters will be recorded on the field data sheets at 3 minute intervals. The groundwater sample will be collected after all four parameters have stabilized (three consecutive measurements within 10%), indicating adequate purging. At a minimum, the amount of water that can be contained by the tubing from the pump to the ground surface will be purged from the well to ensure sample quality.

Purge water will be disposed of on the ground surface no closer than 20 feet from any well. If any well produces water with constituents exceeding primary drinking water quality standards (determined from the most recent sampling event) all purge water from that well will be containerized and disposed of appropriately.

3.4 FIELD MEASUREMENTS

Field parameters, including specific conductance, dissolved oxygen, temperature, and pH, will be monitored at three minute intervals and recorded on field data sheets. After the parameters stabilize the groundwater sample will be collected. Monitoring probes will not be placed into the sample containers which will be submitted to the laboratory for analysis. After the water in the beaker is tested for field parameters it will be disposed of. After samples have been collected for laboratory analysis, another beaker of water is to be retested for pH, temperature, dissolved oxygen, and specific conductance as a measure of purging efficiency and as a check of the stability of the water samples over time. These readings, along with date, time, well ID, purge volume, and presampling and post sampling water levels, will be recorded on the Groundwater Monitoring Data Sheet. The instrument(s) used to perform field measurements will be calibrated prior to sampling each well.

3.5 SAMPLE COLLECTION AND PRESERVATION

After the field parameters have stabilized (dissolved oxygen is considered to be the best indicator) the pump discharge rate will be adjusted to a low flow of approximately 0.1 liters per minute to minimize the potential for bottle overtopping. The groundwater sampler will wear a new pair of disposable gloves to handle sampling equipment and sample containers at each well. The groundwater samples will be collected directly from the pump discharge line into laboratory supplied bottles without filtering. Table 3 summarizes the types of containers and associated preservatives that will be used for sample storage and transport. Any required preservatives will be added to the containers in advance by the laboratory.

Table 3

REQUIRED SAMPLE CONTAINERS AND PRESERVATIVES			
Parameter	**Sample Container**	**Preservative**	**Holding Time**
Volatile Organic Compounds (VOCs)	Five (5) 40 ml glass vials with Teflon-lined lid	HCL, 4°C	14 days
EDB, DBCP	Two (2) 40 ml glass vials with Teflon-lined lid	Na_2SO_4, 4°C	14 days
TOC and NH_3	One (1) 16 ounce HDPE	H_2SO_4, 4°C	28 days
Inorganics	One (1) ½ gallon HDPE	4°C	28 days
Metals	One (1) 16 ounce HDPE	HNO_3, 4°C	6 months

Sample containers will be filled in the following order to minimize degradation of sensitive parameters:

1. VOCs
2. TOC and NH_3
3. Inorganics
4. Metals

Care should be taken to maintain the lids on the containers until the time to fill the container with the sample. Once filled, the containers should be immediately capped to minimize contact with dust and ambient air, and to avoid volatilization of the sample. The VOC vials will be completely filled with zero head space. Samples will be labeled and immediately stored on ice in a cooler until delivered to the laboratory for analysis under chain of custody. Field blank and duplicate samples will be prepared as part of the QA/QC Plan outlined in Section Six.

3.6 DECONTAMINATION

The water level indicator, field parameters instrument(s) and any other sampling equipment will be decontaminated between wells with a non-phosphate detergent, then triple rinsed with distilled (or deionized) water.

3.7 SAMPLE HANDLING

Once collected, each sample will be immediately labeled, recorded on the Groundwater Monitoring Data Sheet, and placed in a sample cooler with ice for transport to the laboratory. All samples will be delivered to the State of Utah Certified laboratory within a sufficient time frame to insure that project hold times will not be exceeded by the laboratory for the specified parameters. Each sample will be accompanied by a chain-of-custody form filled out at the time of sample collection.

3.8 DOCUMENTATION

An essential part of the sample collection activity is the documentation of the site measurements and ensuring the integrity of the sample from collection to data reporting. The following records and actions will be taken.

1. Sample Labels. All samples will be labeled with the sample identification, name of the sampler, date and time of collection, and type of preservative (if required). The sample label will be filled out completely and attached to each sample bottle or container at the time of collection.

2. Chain-of-Custody. A chain-of-custody form will accompany all samples from the time of collection to completion of laboratory analysis. The chain-of-custody record will establish the documentation necessary to trace sample possession from the time of collection through receipt by the analytical laboratory. The original form will accompany the samples to the laboratory and copies will go into the project file. Original forms will be returned with the analytical results from the laboratory.

3. Sampling Record. Pertinent field measurements and observations noted during sampling will be recorded by the field technician on the Groundwater Monitoring Data Sheet (one for each well) and in his field notes.

Examples of the Sample Labels, Chain-of-Custody, and Groundwater Monitoring Data Sheet forms are included in Attachment 2.

3.9 SAMPLE IDENTIFICATION

Each sample will be given a unique identification consisting of the monitor well ID. For example, groundwater sampled from monitor well BH-2 will be labeled "BH-2". The field duplicate sample will generally be obtained from BH-2 or BH-5 and will be labeled "BH-9" and field notes will verify from which monitor well it was obtained.

SECTION FOUR

LYSIMETER SAMPLING PROCEDURES

4.1 GENERAL

The following subsections detail specific sampling techniques and methodology to be used during all lysimeter monitoring to provide consistent quality monitoring data. Sampling personnel must have a copy of the approved Groundwater and Leachate Monitoring Plan in the field during each sampling event. The lysimeter will be sampled semi-annually during the groundwater sampling events to provide information about leachate production rates and quality. Pan lysimeters are not considered a point of compliance for groundwater monitoring as required by UACR 315-308.

The sampling procedures consist of obtaining water levels and samples from the pan lysimeter, identified in the site map, utilizing a water level indicator and pump. Coordination for conducting the sampling events will be established prior to sampling. Sampling equipment will be prepared and properly calibrated prior to each sampling event. All information obtained in the field shall be recorded on a Groundwater Monitoring Data Sheet, similar to the one presented in Attachment 2.

Sampling will use currently accepted and approved technology or approved equivalent techniques. Sampling will be performed by competent personnel who are familiar with proper sampling techniques, and health and safety procedures. Samplers should also be knowledgeable in techniques of sample collection and preservation, decontamination, and quality assurance/quality control (QA/QC). The sampler will wear a new pair of latex gloves at each location for handling sampling equipment and containers.

4.2 WATER LEVEL MEASUREMENTS

Water levels will be obtained in the lysimeter stand pipe. Depth to leachate and total leachate depth will be measured. Prior to sampling, water level readings must be obtained using a conductivity-based water level indicator or equivalent instrument capable of obtaining measurements. The probe will be decontaminated between each use by washing with a non-phosphate detergent and rinsing three times with deionized or distilled water. The probe will then be lowered into the stand pipe until the level indicator alarm sounds or light goes on. The depth to water is read from the top of the cap to the nearest 0.01 foot. The depth will be recorded immediately on the Groundwater Monitoring Data Sheet to the nearest 0.01 feet. The water level indicator or weighted tape measure will then be lowered until the bottom is reached and the total depth recorded to the nearest 0.01 feet.

4.3 LYSIMETER SAMPLING

If leachate is detected in the lysimeter then all the leachate collected in the pan lysimeter will be removed using a bailer or pump. A sample will be obtained from the removed leachate and immediately be placed into sample bottles to ensure as much sample as possible will be collected. Any excess leachate will be containerized for proper disposal based on the chemical properties as determined from the laboratory analysis. Total volume of leachate removed from the lysimeter will be recorded on the field data sheet.

4.4 FIELD MEASUREMENTS

Leachate will not be sampled for field parameters to minimized the risk of cross contamination in the compliance monitoring well network.

4.5 SAMPLE COLLECTION AND PRESERVATION

Sample containers will be filled in the following order to minimize degradation of sensitive parameters:

1. VOCs
2. TOC and NH_3
3. Inorganics
4. Metals

Care should be taken to maintain the lids on the containers until the time to fill the container with the sample. Once filled, the containers should be immediately capped to minimize contact with dust and ambient air, and to avoid volatilization of the sample. The VOC vials will be completely filled with zero head space. Samples will be labeled and immediately stored on ice in a cooler until delivered to the laboratory for analysis under chain of custody. Field blank and duplicate samples will be prepared as part of the QA/QC Plan outlined in Section Six. Samples for the lysimeter shall not be stored or transported in the same cooler as the compliance monitoring well samples.

4.6 DECONTAMINATION

The water level indicator and any other sampling equipment used will be decontaminated between locations with a non-phosphate detergent, then triple rinsed with distilled (or deionized) water.

4.7 SAMPLE HANDLING

Once collected, each sample will be immediately labeled, recorded on the Groundwater Monitoring Data Sheet, and placed in a sample cooler, separate from the compliance monitoring well samples, with ice for transport to the laboratory. All samples will be delivered to the State of Utah Certified laboratory within a sufficient time frame to insure that project hold times will not be exceeded by the laboratory for the specified parameters. Each sample will be accompanied by a chain-of-custody form filled out at the time of sample collection.

4.8 DOCUMENTATION

An essential part of the sample collection activity is the documentation of the site measurements and ensuring the integrity of the sample from collection to data reporting. The following records and actions will be taken.

1. Sample Labels. All samples will be labeled with the sample identification, name of the sampler, date and time of collection, and type of preservative (if required). The sample label will be filled out completely and attached to each sample bottle or container at the time of collection.

2. Chain-of-Custody. A chain-of-custody form will accompany all samples from the time of collection to completion of laboratory analysis. The chain-of-custody record will establish the documentation necessary to trace sample possession from the time of collection through receipt by the analytical laboratory. The original form will accompany the samples to the laboratory and copies will go into the project file. Original forms will be returned with the analytical results from the laboratory.

3. Sampling Record. Pertinent field measurements and observations noted during sampling will be recorded by the field technician on the Groundwater Monitoring Data Sheet (one for each well) and in his field notes.

Examples of the Sample Labels, Chain-of-Custody, and Groundwater Monitoring Data Sheet forms are included in Attachment 2.

4.9 SAMPLE IDENTIFICATION

Each sample will be given a unique identification consisting of the monitor well ID. For example, leachate sampled from the lysimeter will be labeled "L-1".

SECTION FIVE

SAMPLE ANALYSIS

5.1 DETECTION MONITORING ANALYSIS

All laboratory chemical analyses will be conducted according to EPA standards and procedures as set forth in EPA SW-846 or other EPA approved test method. Samples will be analyzed for constituents listed in R315-308-4 using the recommended EPA Method. The laboratory will follow the procedures as described and identified and/or adjust for potential interferences. Laboratory personnel will provide information on the precision and accuracy of the testing, and include results of QA/QC laboratory samples. A list of parameters, EPA methods, required detection limits, and holding times are provided in Table 4.

The Rule states in R315-308-2(4)(d) that analysis shall be performed for the required constituents on unfiltered samples. Samples will be collected without filtering in the field and the laboratory will be instructed to analyze unfiltered samples.

SECTION SIX

QUALITY ASSURANCE/QUALITY CONTROL

A detailed quality assurance/quality control (QA/QC) Plan has been developed for sampling and analysis of the groundwater and leachate. The objective of the monitoring Plan is to obtain high quality, consistent data that may be used to track long-term variations and trends in the groundwater at the site. Specific QA/QC procedures have been developed to accomplish this objective, as well as to identify sampling or laboratory analytical errors which may occur. A Quality Assurance Officer (QAO) will be assigned by Iron County to review the data for completeness, accuracy and precision. The QAO is generally affiliated with the organization performing the sampling.

6.1 ACCURACY

Accuracy is the nearness of a measurement or set of measurements to the true value. It is evaluated by means of a matrix spike sample analysis. A known quantity of analyte is added to sample matrix. The spike concentrations added are 1.0 ppm for metals and 20 ppb for volatile organic compounds. A sample identified as a field blank may not be used for the analysis. Spike recovery is calculated using the following equation:

$$\%R = \frac{(SSR-SR)}{SA} X\ 100$$

Where:	R	=	Spike Recovery
	SSR	=	Spiked Sample Result
	SR	=	Sample Result
	SA	=	Spike Added

Target recoveries of 80% to 120% are acceptable for most analytes (70% to 130% for arsenic, lead, selenium, and thallium). Some organic constituents have acceptable ranges of 60% to about 140%. If the spike recovery falls outside the specified range, the data will be qualified as "estimated" or "rejected".

6.2 PRECISION

Precision is an assessment of the agreement between a set of replicate measurements without assumption or knowledge of the true value. Precision is evaluated by means of duplicate sample analysis.

Precision is determined using the following formula:

$$RPD = \frac{(S-D)}{(S+D)/2} X\ 100$$

Where	RPD	=	Relative Percent Difference
	S	=	Sample Result
	D	=	Duplicate Sample Result

Duplicate samples will have a control limit of ±20% for the Relative Percent Difference (RPD) for sample values greater than 5 times the laboratory detection limit (LDL). If the sample values are less than 5 times the laboratory detection limit, a control limit of ± the LDL shall be used.

If field duplicate analysis results for a particular Analyte falls outside the control windows of ±20% or ±LDL, which ever is appropriate, the results for that Analyte in all other samples associated with that laboratory set may be flagged as estimated.

6.3 QA/QC SAMPLES

6.3.1 Field Duplicates

A blind duplicate sample will be collected and submitted for analysis during each sampling round to assess data precision. It will be labeled in such a way so its identity as a duplicate sample will not be known by the analytical laboratory.

6.3.2 Laboratory QA/QC Samples

The laboratory is required to provide results for two types of QA/QC samples: method blanks and matrix spike/matrix spike duplicates. Method blank results are required for each analyte listed in Table 4. Matrix spike/matrix spike duplicates are required for each metal and inorganic analyte and for a representative number of organic analytes.

Method blanks provide verification that an analyte has not been introduced into the sample during laboratory handling and analysis. Matrix spike/matrix spike duplicates provide an indication of the laboratory accuracy and precision.

6.3.3 Trip and Field Blanks

A trip blank and a field blank will be prepared and sealed by the analytical laboratory prior to the sampling event. Both blanks will be prepared by the laboratory using aqueous solutions that are ASTM Grade 2 reagent.

The trip blank will be transported to the sampling site and back to the laboratory without being opened, accompanying the sample bottles the entire time. It serves as a check on sample contamination originating from sample transport, shipping, and from site conditions.

The field blank container is opened in the field for the same amount of time as the collection of one of the groundwater samples. It is then sealed and is transported with the other samples to the laboratory. It serves as a check on environmental contamination.

The trip blank and field blank will be analyzed if the previous round of groundwater sampling detected any organic constituents, or if inorganic constituents are detected to be significantly above background concentrations. If an unexpected contaminant is encountered in a groundwater sample from the site, the field blank and trip blank will be analyzed after the next sampling event to rule out contamination originating from another source. The blanks would be analyzed for the same landfill parameters listed in Table 4.

6.4 REPORTING LIMITS

The laboratory is required to meet the established reporting limits given in Table 4 for each analyte. The reporting limits are designed to be below the drinking water quality criteria. If the laboratory is unable to meet the required limit for an analyte or group of analytes due to characteristics of the sample, the laboratory is required to contact Iron County or their sampling representative immediately. If changes in the sampling protocol or established reporting limit are necessary, the DSHW will be immediately notified.

6.5 LABORATORY INTERNAL QUALITY CONTROL

6.5.1 Calibration Procedures and Frequency

Laboratories subcontracted to perform chemical analyses will be certified by the State of Utah for environmental analysis. The laboratory must provide a copy of the most recent letter from the Utah Bureau of Laboratory Improvement certifying that the laboratory is approved for each of the analyses performed. As such, they will follow the calibration procedures according to and at the minimum frequency required by the State of Utah.

6.5.2 Internal Quality Control Checks

The laboratory will conduct internal quality control checks according to its own QA Plan that is a part of State certification requirements. The laboratory will summarize the results of these quality control checks and submit them with the analytical results.

The quality control checks and the laboratory performance and system audits will include:

1. Method blanks
2. Laboratory control samples
3. Calibration check samples
4. Replicate samples
5. Matrix-spiked samples
6. "Blind" quality control samples
7. Control charts
8. Surrogate samples
9. Zero and span gases
10. Reagent quality control checks

6.5.3 Preventive Maintenance Procedures and Schedules

Preventive maintenance procedures and schedules will be followed according to specifications outlined in the requirements for laboratory certification by the State.

6.5.4 Corrective Action for Laboratory Problems

Corrective action will be initiated if results of analysis are not within the precision, accuracy and completeness specified in Sections 6.1, 6.2, 6.3, 6.4, 6.5.1 and 6.5.2 of the Groundwater and Leachate Monitoring Plan. Sufficient quantities of sample will be retained by the lab so that parameters could be reanalyzed if results are unacceptable and hold times have not been exceeded. In the event that hold times are exceeded, the QAO will decide if a resampling and reanalysis is required.

SECTION SEVEN

DATA ANALYSIS PLAN

7.1 DATA VALIDATION

When the laboratory data is received, it will be reviewed by the QAO to assess data validity. The data package will be checked to insure that:

- Sample I.D's match chain-of-custody and field notes and can be matched to sample location, date, and time.
- Samples were analyzed by requested methods.
- Samples were analyzed within holding times.
- Analysis reporting limits are acceptable.
- Laboratory method blank results are included and acceptable.
- Laboratory matrix spike/matrix spike duplicate results for representative analytes are included and acceptable.
- Field duplicate sample results are included and acceptable.

If potential problems or discrepancies are encountered, the laboratory will be notified and requested to help resolve the question. If the cause of the problem cannot be located, the affected data will be qualified or the affected wells will be resampled, depending on the severity of the problem. The QAO will use professional judgment to assign qualifiers to data that do not meet the required data quality objectives. If the data appears usable and can be combined with the historical data with no reservations, then no qualifier will be attached. The reasoning will be detailed in the report prepared for the sampling event.

If the data appears to accurately represent the presence or absence of an analyte, but the quantification of the analyte is in question, then a "J" will be assigned to the reported concentration to indicate it is an estimated quantity. An example of this might be a case where arsenic is reported in the sample, but arsenic recoveries in the matrix spike/matrix spike duplicate are very low (such as 50%). The QAO may feel that the reported arsenic value is useful information even if the result is probably too low. In this case, a "J" would appear next to the reported result in subsequent tabulations of the data for that well.

If the data for an analyte appear compromised to the point where the reported result is not useful (such as the appearance of methylene chloride in the method blank and in a sample at similar concentrations), the data will receive an "R" qualifier indicating it is rejected. The reported result will continue to be shown in subsequent tabulations, but the "R" qualifier will flag the user not to include the result in statistical compilations, etc.

In all cases where data receive qualifiers, an explanation of the QAO's judgement will be given in the report of the sampling round where the qualified data are first reported.

7.2 DATA ANALYSIS

The data will be analyzed by:

- Looking for the presence of non-naturally occurring compounds in the sample (such as volatile organic compounds), and
- Plotting the concentrations of naturally occurring constituents (metals and minerals) in each well on control charts for that well.

If non-naturally occurring compounds are reported by the laboratory, the validity of the results(s) will be assessed by reviewing method blank results, raw laboratory data, the compound's potential status as a common laboratory contaminant, and the reported concentration relative to the method detection limit. If the positive results appear potentially valid, the affected well will be resampled to verify the result.

The relative concentrations of naturally-occurring constituents will be analyzed to assess whether the water is impacted. Inter-well comparisons of water quality data, between upgradient and downgradient wells, are at times complicated by natural variations within the wells.

Background water quality will be established by reviewing a minimum of eight independent sampling event results from each upgradient well and a minimum of four independent sampling event results from each downgradient well.

Once the background levels are established for the site wells, the control chart approach will be the statistical method used to analyze the sampling data from each succeeding sample event. The statistical method will satisfy the requirements of R315-308-2(7) (d).

7.3 DATA REPORTING

Semi-annual monitoring reports will be prepared within 60 days of the sampling date, which will include the following information:

- Description of sampling activities
- Discussion of data validity
- Discussion of laboratory QA/QC
- Presentation of water elevation measurements, groundwater direction and flow rate
- Presentation of field and laboratory data

SECTION EIGHT

SITE SAFETY

In order to satisfy the requirement listed in R315-308-2(3)(g), the following health and safety procedures will be followed to ensure employee health and safety during well installation and monitoring at the site.

8.1 DRILLING

If drilling is required at site, it will be performed by drillers and geologist/engineering personnel who have had 40 hour HAZWOPER training in accordance with OSHA requirements set forth in 29 CFR 1910. Workers should become familiar with the site and potential hazards before initiating the work, by talking with the landfill manager. It is recommended that workers utilize Level D personal protection consisting of:

- Coveralls and long sleeve shirt
- Safety boots or shoes
- Safety glasses or goggles
- Hard hat
- Work gloves.

8.2 MONITORING

Groundwater and Leachate Monitoring shall be performed by personnel who have had 40 hour HAZWOPER training in accordance with OSHA requirements set forth in 29 CFR 1910. It is also recommended that personnel performing the groundwater sampling have attended a sampling procedure class such as the State of Utah UST Soil and Groundwater Sampler training and certification. Workers should become familiar with the site and potential hazards before the work is performed, by talking with the landfill manager. It is recommended that workers utilize Level D personal protection consisting of:

- Coveralls and long sleeve shirt
- Safety boots or shoes
- Safety glasses or goggles
- Vinyl gloves

SECTION NINE

REFERENCES

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Tahoma Resources, *Groundwater Monitoring Plan, Addendum to the Groundwater Discharge Permit Application, Proposed Armstrong Pit Landfill Site*, Iron County, Utah, January 31, 1992.

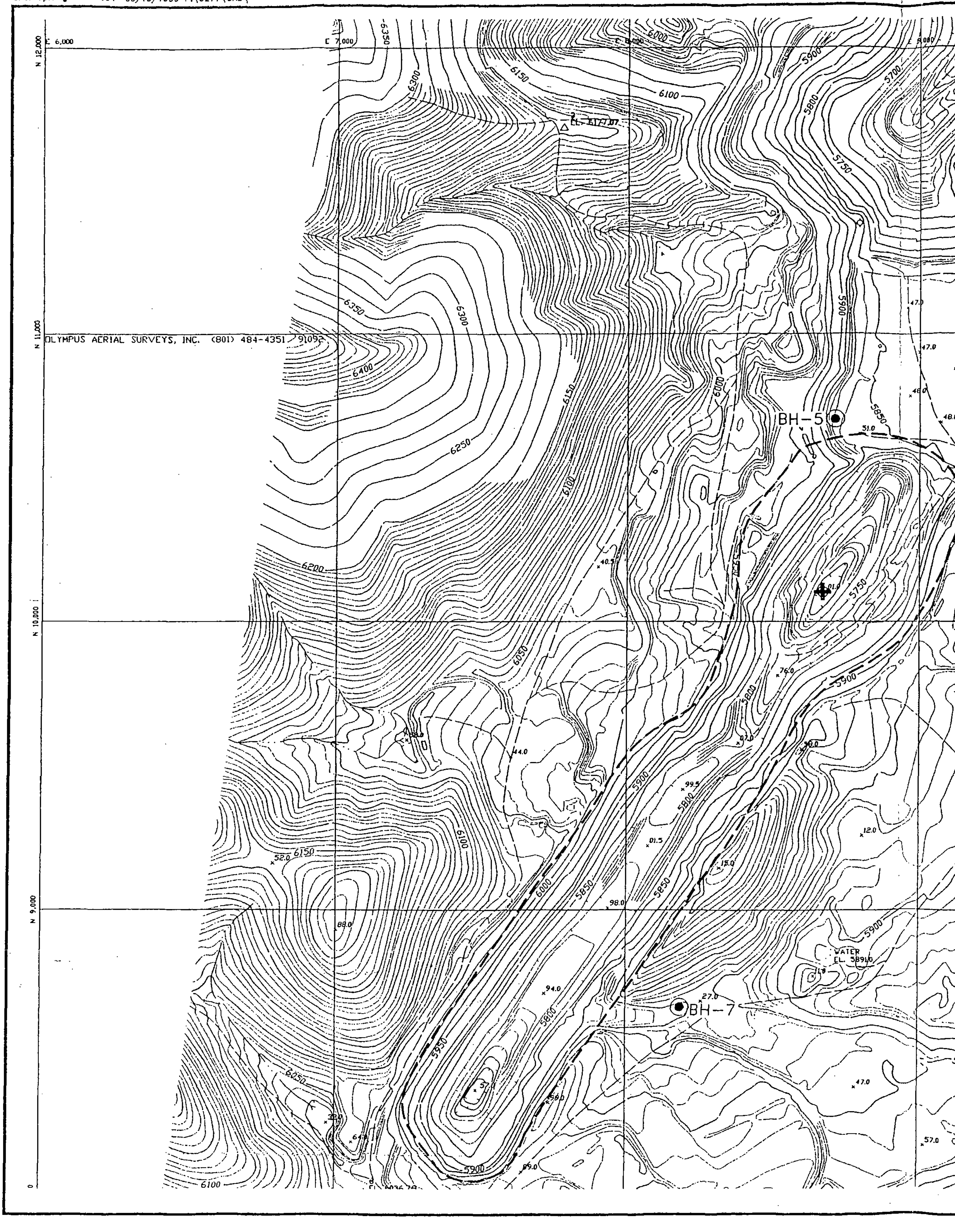
TABLE 4

GROUNDWATER SAMPLING PARAMETERS IRON COUNTY MUNICIPAL LANDFILL			
CONSTITUENT	Method	Detection Limit (mg/L)	Hold Time
METALS (total)			
Antimony	7041	0.002	6 months
Arsenic	7060	0.005	6 months
Barium	6010	0.002	6 months
Beryllium	6010	0.001	6 months
Cadmium	6010	0.003	6 months
Chromium	6010	0.01	6 months
Cobalt	6010	0.01	6 months
Copper	6010	0.004	6 months
Lead	7421	0.005	6 months
Mercury	7470	0.0002	28 days
Nickel	6010	0.01	6 months
Selenium	7740	0.005	6 months
Silver	6010	0.01	6 months
Thallium	7841	0.001	6 months
Vanadium	6010	0.005	6 months
Zinc	6010	0.01	6 months
INORGANIC CONSTITUENTS			
Ammonia (as N)	350.1	0.05	28 days
Bicarbonate (as CaCO3)	310.1	10	28 days
Carbonate (as CaCO3)	310.1	10	28 days
Calcium	6010	0.05	6 months
Chloride	300	0.5	28 days
Iron	6010	0.01	6 months
Magnesium	6010	0.05	6 months
Manganese	6010	0.005	6 months
Nitrate (as N)	352.2	0.01	48 hours
pH	150.1	0.1	Immediately
Potassium	6010	0.1	6 months
Sodium	6010	0.1	6 months
Sulfate	375.4	5.0	28 days
TDS	160.1	10.0	7 days
TOC	415.1	10.0	28 days

TABLE 4

GROUNDWATER SAMPLING PARAMETERS IRON COUNTY MUNICIPAL LANDFILL			
CONSTITUENT	Method	Detection Limit (mg/L)	Hold Time
ORGANIC CONSTITUENTS			
Acetone	8260	0.010	14 days
Acrylonitrile	8260	0.005	14 days
Benzene	8260	0.002	14 days
Bromochloromethane	8260	0.002	14 days
Bromodichloromethane	8260	0.002	14 days
Bromoform	8260	0.002	14 days
Carbon Disulfide	8260	0.002	14 days
Carbon Tetrachloride	8260	0.002	14 days
Chlorobenzene	8260	0.002	14 days
Chloroethane	8260	0.005	14 days
Chloroform	8260	0.002	14 days
Dibromochloromethane	8260	0.002	14 days
1,2-Dibromo-3-chloropropane	504	0.0002	14 days
1,2-Dibromoethane	504	0.00002	14 days
1,2-Dichlorobenzene	8260	0.002	14 days
1,4-Dichlorobenzene	8260	0.002	14 days
trans-1,4-Dichloro-2-butene	8260	0.010	14 days
1,1-Dichloroethane	8260	0.002	14 days
1,2-Dichloroethane	8260	0.002	14 days
1,1-Dichloroethylene	8260	0.002	14 days
cis-1,2-Dichloroethylene	8260	0.002	14 days
trans-1,2-Dichloroethylene	8260	0.002	14 days
1,2-Dichloropropane	8260	0.002	14 days
cis-1,3-Dichloropropene	8260	0.0005	14 days
trans-1,3-Dichloropropene	8260	0.0005	14 days
Ethylbenzene	8260	0.002	14 days
2-Hexanone	8260	0.005	14 days
Methyl bromide	8260	0.005	14 days
Methyl chloride	8260	0.002	14 days
Methylene bromide	8260	0.002	14 days
Methylene chloride	8260	0.002	14 days
Methyl ethyl ketone	8260	0.010	14 days
Methyl Iodide	8260	0.005	14 days
4-Methyl-2-pentanone	8260	0.005	14 days
Styrene	8260	0.002	14 days
1,1,1,2-Tetrachloroethane	8260	0.002	14 days
1,1,2,2-Tetrachloroethane	8260	0.002	14 days
Tetrachloroethylene	8260	0.002	14 days
Toluene	8260	0.002	14 days
1,1,1-Trichloroethane	8260	0.002	14 days
1,1,2-Trichloroethane	8260	0.002	14 days
Trichloroethylene	8260	0.002	14 days
Trichlorofluoromethane	8260	0.002	14 days
1,2,3-Trichloropropane	8260	0.002	14 days
Vinyl acetate	8260	0.005	14 days
Vinyl chloride	8260	0.002	14 days
Xylenes	8260	0.002	14 days

Sitemap.dwg JST 05/13/1999 P:\3277\CAD\



ATTACHMENT 1
WELL LOGS, COMPLETION DETAILS
AND
LYSIMETER CONSTRUCTION DETAILS

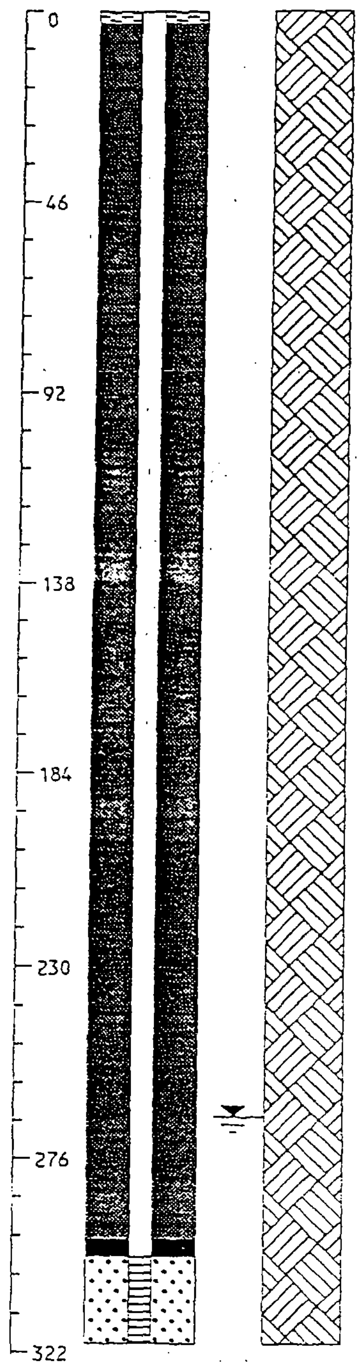
DRILL HOLE LOG

MONITOR WELL NO.: BH-2

PROJECT: Iron County Landfill
CLIENT/OWNER: Iron County Landfill
HOLE LOCATION: North of the existing landfill
DRILLER: Boyles Bros. Drilling
DRILL RIG: NA
DEPTH TO WATER: 266'   HOLE DIAMETER: 6.25"

PROJECT NO.: 3277-004
DATE: 9-10-90
TOC ELEV.: 5652.18'
GS ELEV.: NA
LOGGED BY: NA
WELL NO.: BH-2

ELEVATION / DEPTH	WELL DETAILS	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Sample Number	Sample Depth (ft)	Recovery (in/in)
			QZ	QUARTZ			



Well completion details based on available information. Drill hole log based on BH-5 located approximately 1600 ft to the southwest.

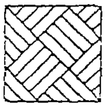
Figure No. 1

BINGHAM ENVIRONMENTAL

KEY TO SYMBOLS

Symbol Description

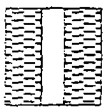
Strata symbols

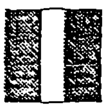

Quartz

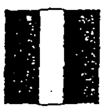
Misc. Symbols

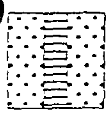

Water table

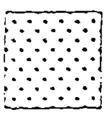
Monitor Well Details


Protective well cover set in concrete


Bentonite-cement slurry blank 1.5" O.D. schedule 40 PVC pipe


Bentonite seal blank 1.5" O.D. schedule 40 PVC pipe


Silica sand .010" slot 1.5" O.D. schedule 40 PVC pipe.


Silica sand no PVC pipe

Notes:

1. Monitor well BH-2 was drilled and installed on September 10, 1990. The holes were drilled with the use of a truck mounted drill rig utilizing 6.25 inch O.D. rotary and down-hole hammer with air.

2. Water level shown on the drill hole log was measured on September 13, 1990.

3. The exact location of BH-2 is 365 feet North and 120 feet west from South 1/4 corner, Section 29, Township 35 South, Range 12 West, SLBM.

4. This drill log represents a compilation of the best available data from the February 1994 permit application and well log for BH-5 located approximately 1600 feet to the Southwest.

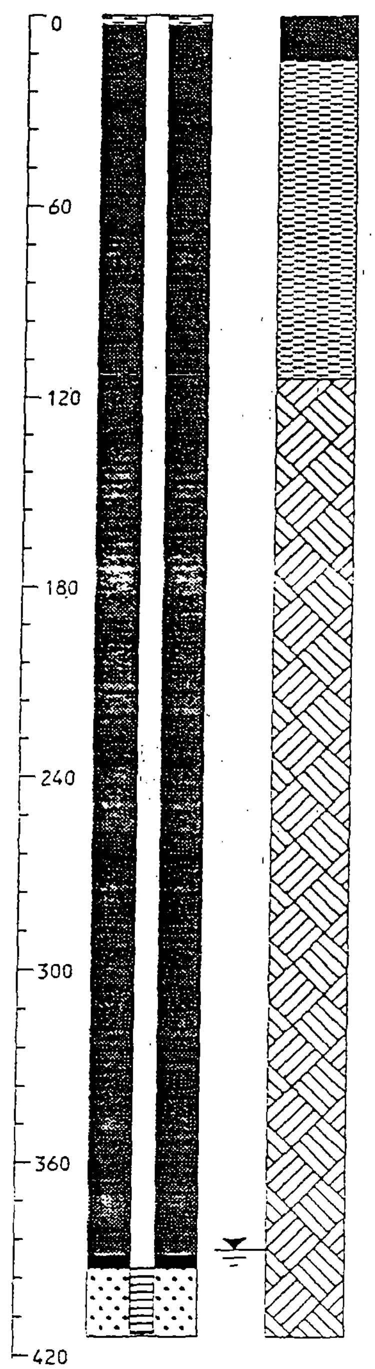
5. These logs are subject to the limitations, conclusions, and recommendations in this report.

DRILL HOLE LOG
MONITOR WELL NO.: BH-5

PROJECT: Iron County Landfill
CLIENT/OWNER: Iron County Landfill
HOLE LOCATION: North end of the existing landfill
DRILLER: Boyles Bros. Drilling
DRILL RIG: NA
DEPTH TO WATER: 387'   HOLE DIAMETER: 6.25"

PROJECT NO.: 3277-004
DATE: 10-13-91
TOC ELEV.: 5857.03'
GS ELEV.: NA
LOGGED BY: NA
WELL NO.: BH-5

ELEVATION / DEPTH	WELL DETAILS	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Sample Number	Sample Depth (ft)	Recovery (in/in)
			FILL	Shot Rock Fill			
				Siltstone and Limestone			
			QZ	Quartz Monzonite			

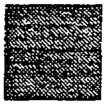
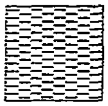
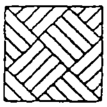
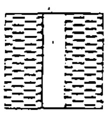
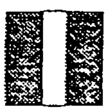
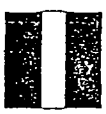
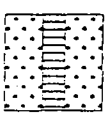
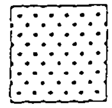


Well completion details based on available information.

Figure No. 1

BINGHAM ENVIRONMENTAL

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Fill
	Siltstone
	Quartz
Misc. Symbols	
	Water table
Monitor Well Details	
	Protective well cover set in concrete
	Bentonite-cement slurry blank 2.5" O.D. schedule 40 PVC pipe
	Bentonite seal blank 2.5" O.D. schedule 40 PVC pipe
	Silica sand .010" slot 2.5" O.D. schedule 40 PVC pipe.
	Silica sand no PVC pipe

Notes:

1. Monitor well BH-5 was drilled and installed on October 13, 1991. The holes were drilled with the use of a truck mounted drill rig utilizing 6.25 inch O.D. rotary and down-hole hammer with air.
2. Water level shown on the drill hole log was measured on October 18, 1991.
3. The exact location of BH-5 is 934 feet South and 3819 feet West from the NE corner, Section 32, Township 35 South, Range 12 West, SLBM.
4. This drill log represents a compilation of the best available data from the February 1994 permit application and well log for BH-5.
5. These logs are subject to the limitations, conclusions, and recommendations in this report.

DRILL HOLE LOG
MONITOR WELL NO.: BH-7

PROJECT: Iron County Landfill
CLIENT/OWNER: Iron County Landfill
HOLE LOCATION: South end of existing landfill
DRILLER: Boyles Bros. Drilling
DRILL RIG: NA
DEPTH TO WATER: 443'
HOLE DIAMETER: 6.25"

PROJECT NO.: 3277-004
DATE: 10-30-91
TOC ELEV.: 5923.72
GS ELEV.: NA
LOGGED BY: NA
WELL NO.: BH-7

ELEVATION / DEPTH	WELL DETAILS	SOIL SYMBOLS, SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Sample Number	Sample Depth (ft)	Recovery (in/in)
			FILL	Artificial Fill			
				Siltstone, Shale, and Sandstone			

Well completion details based on available information.

Figure No. 1

KEY TO SYMBOLS

Symbol Description

Strata symbols

Fill

Siltstone

Misc. Symbols

Water table

Monitor Well Details

Protective well cover set
in concrete

Bentonite-cement slurry blank 2.5" O.D.
schedule 40 PVC pipe

Bentonite seal blank 2.5" O.D.
schedule 40 PVC pipe

Silica sand .010" slot 2.5" O.D.
schedule 40 PVC pipe.

Silica sand no PVC pipe

Notes:

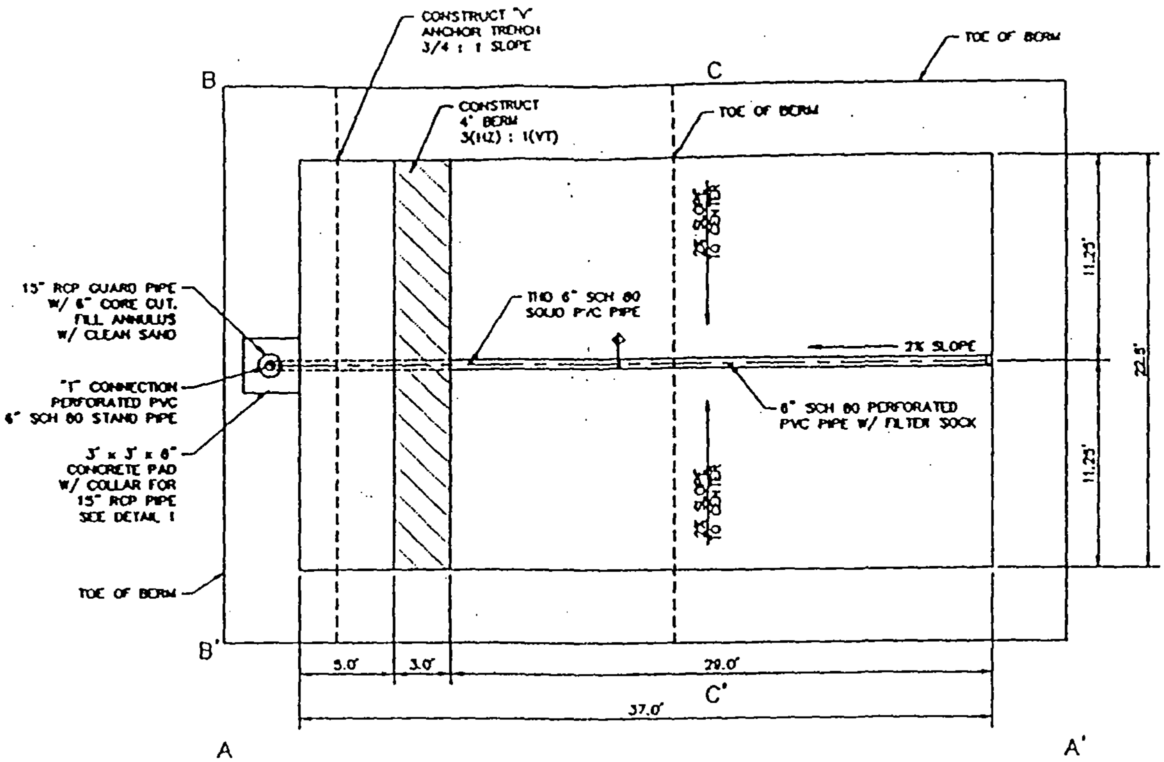
1. Monitor well BH-7 was drilled and installed on October 30, 1991. The holes were drilled with the use of a truck mounted drill rig utilizing 6.25 inch O.D. rotary and down-hole hammer with air.

2. Water level shown on the drill hole log was measured on December 10, 1991.

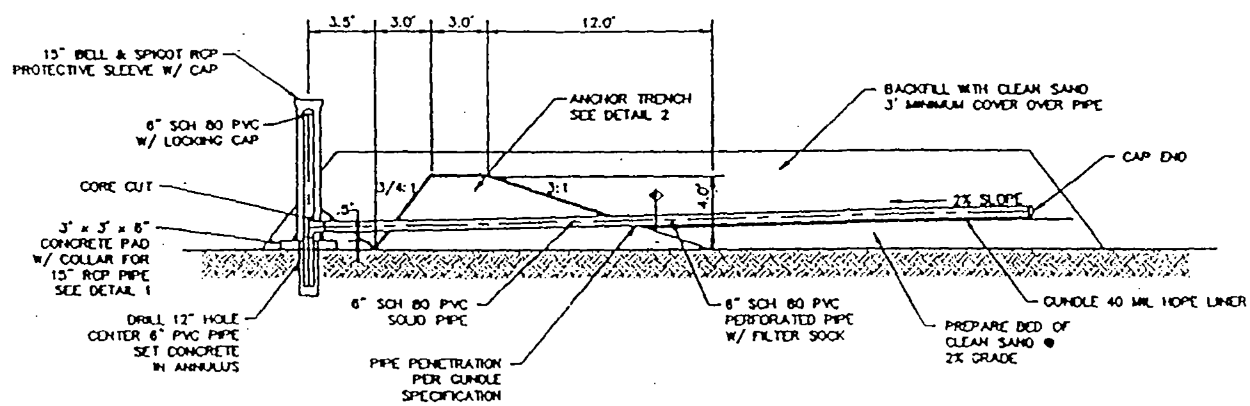
3. The exact location of BH-7 is 3027 feet South and 4469 feet west from the NE corner, Section 32, Township 35 South, Range 12 West, SLBM.

4. This drill log represents a compilation of the best available data from the February 1994 permit application and well log for BH-7.

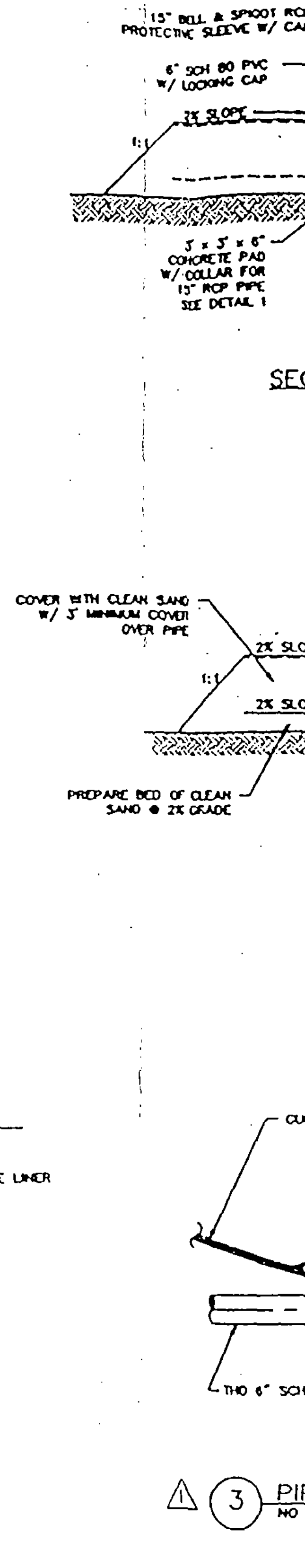
5. These logs are subject to the limitations, conclusions, and recommendations in this report.



PLAN VIEW



SECTION A – A'



	No.	Revision	By	Date
	1	PENETRATION DETAILS	RHW	2/94
Date				

Project Number EI 14 02 94
Designed By RHW
Drawn By SRP
Checked By ______ Date ______

ECKHOFF WAT

ENGINEERS PLANNE

ATTACHMENT 2
SAMPLING FORMS

GROUNDWATER MONITORING SHEET

Date: ______________ Well ID/Sampling Location: ______________

Job Number: ______________ Time of Arrival at Well: ______________

Owner: ______________ Air Temperature: ______________

Site Description: ______________

Weather Conditions: ______________________________

Sampled By: ______________________________

Sampling Equipment: ______________________________

Pump Depth (ft.): ______________ Time Pump On: ______________

Depth to Well Bottom (ft.): ______________ Time Pump Off: ______________

Depth to Groundwater (ft.): Purge Volume (gal.): ______________

Presampling: ______________ Purge Flow Rate (l/min.): ______________

Postsampling: ______________ Sample Flow Rate (l/min.): ______________

Well in good condition? ☐Yes ☐No

Was lock secured upon arrival? ☐Yes ☐No

Is well operating correctly? ☐Yes ☐No

Explain any problems that may exist:

____

____

Time	PH	Dissolved Oxygen	Spec. Conductivity/Corrected	Temp.
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	
			/	

Receiving Laboratory: ______________ Date Received: ______________

Comments:

____

____

____

____

____

Sampler's Initials: __________

Example Sample Label

Date ______________________ Time ______________________

Sampler ______________________________________

Sample ID ____________________________________

Description ____

____

____

Preservative ______________________

CHAIN OF

CLIENT ____________________

ADDRESS ____________________

____

PHONE/FAX ____________________

CONTACT ____________________

LAB # ____

SITE

SAMPLER'S SIGNATURE

SAMPLE ID	SAMPLE DATE/TIME	MATRIX	# OF CONTAINERS	BTX/TPH	VOLATILES	SEMIVOLATILES	D LIST METALS	ET PROFILE														TURN AROUND TIME

Quote # /P.O. # ____________________

Special Instructions: ____________________

Relinquished By: *Signature*	Date/Time	Received By: *Signature*
PRINT NAME		PRINT NAME
Relinquished By: *Signature*	Date/Time	Received By: *Signature*
PRINT NAME		PRINT NAME
Dispatched By: *Signature*	Date/Time	Received for Laboratory By:
PRINT NAME		PRINT NAME

APPENDIX F

2003 Annual Groundwater Monitoring Report

ANNUAL
GROUNDWATER MONITORING REPORT - 2003
IRON COUNTY MUNICIPAL LANDFILL
ARMSTRONG PIT
IRON COUNTY, UTAH

April 1, 2004

A Report Prepared For:

Iron County Solid Waste
3127 North Iron Springs Road
PO Box 743
Cedar City, UT 84720
Attn: Mr. Alan Wade

File No.: 12935.001

ANNUAL GROUNDWATER MONITORING REPORT - 2003
IRON COUNTY MUNICIPAL LANDFILL –
ARMSTRONG PIT
IRON COUNTY, UTAH

Prepared by:

For:
Daniel C. Krupicka, PG
Project Geologist

for.
Kerry L. Ruebelmann, R.G.
Senior Geologist

KLEINFELDER, INC.
849 West LeVoy Drive, Suite 200
Taylorsville, Utah 84123
(801) 261-3336

April 1, 2004

TABLE OF CONTENTS

FIGURES

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(continued)

TABLES

APPENDICES

1. EXECUTIVE SUMMARY

This annual groundwater monitoring report presents the results of the groundwater sampling events conducted at the Iron County Landfill near Cedar City, Utah, on March 4, June 17, October 2, and December 18, 2003. Groundwater sampling has been conducted at three monitoring wells near the landfill (designated BH-2, BH-5, and BH-7) since February 1992. Groundwater samples have been collected and analyzed on a regular basis since 1992 for various organic and inorganic parameters as required by the State of Utah Department of Environmental Quality, Division of Solid and Hazardous Waste.

Groundwater data acquired during the period from February 1992 to March 1994, prior to placement of solid waste into the Iron County Landfill, were used to establish "background" conditions for the local groundwater. In addition, sampling results from the approximately two-year period following initial waste placement have been used, where possible, to "update" the background data where the data did not show significant variations from the actual background period.

Due to the detection of low concentrations of organic compounds during 2001 in well BH-5, the State of Utah Division of Solid and Hazardous Waste has required the initiation of assessment monitoring at that well. This has entailed the analysis of additional parameters from well BH-5, as well as a quarterly sampling frequency as required by R315-308-2 (10) and (11). This required the sampling of well BH-5 in June and December 2003 as part of the required quarterly assessment monitoring program for that well, as well as during the regular semi-annual sampling conducted in March and October 2003 for all three monitoring wells at the landfill.

Sampling data from the two semi-annual sampling events in 2003, as well as the June and December assessment sampling events at well BH-5, have been compared to the prediction limits established for each of the statistically monitored analytes in each well. Based on these comparisons, the following can be noted regarding the 2003 groundwater results at the Iron County Landfill:

- No volatile organic compounds were detected at or above their respective prediction limits during 2003 with the exception of 1,1-dichloroethene and tetrachloroethene. Both of these compounds were detected in well BH-5 at or above the prediction limits during 2003, but the reported concentrations are relatively low as compared to the established Groundwater Protection Standards for these compounds.

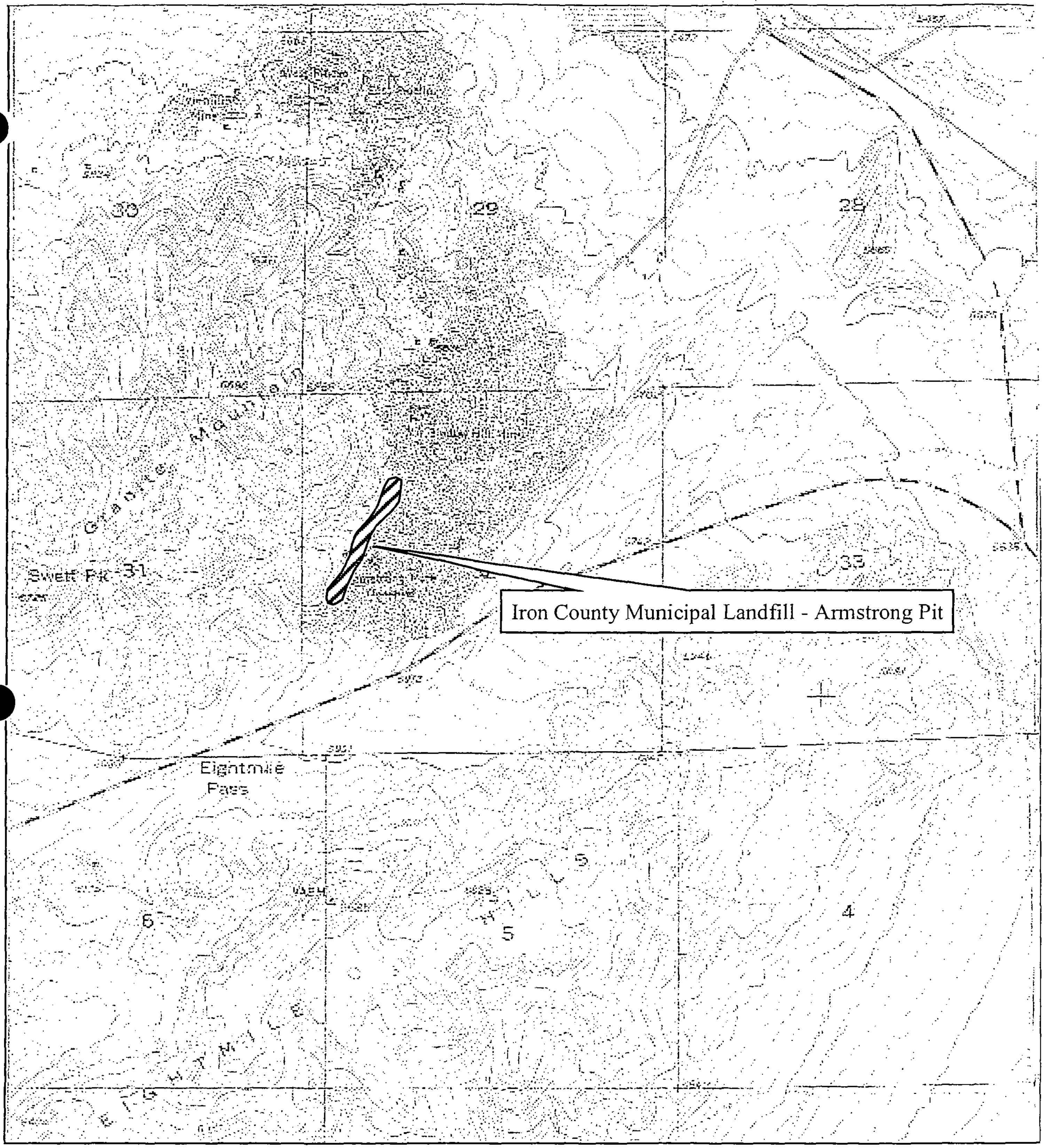
- All metallic analytes were in control for their respective prediction limits for all 2003 sampling events, although vanadium concentrations appear slightly elevated in well BH-2 during the October 2003 sampling. Both vanadium and silver concentrations were slightly elevated in well BH-7 during the October 2003 sampling event.

- Results of the analysis of miscellaneous inorganic parameters indicate that little or no significant changes in groundwater chemistry have occurred during this monitoring period.

- No pesticides or herbicides were detected in well BH-5 above their reporting limits.

- Of the more than 100 semivolatile compounds required for analysis, only pentachlorophenol was detected during assessment monitoring in well BH-5 above the reporting limit. This compound, detected in the sample collected in December 2003 at a concentration of 1.9 micrograms per liter, was not noted during any other sampling event for this reporting period.

- No detections of additionally required assessment monitoring compounds, with the exception of the pentachlorophenol detection, were noted during 2003 assessment monitoring at well BH-5.



BASE MAP:
CEDAR CITY, UTAH
U.S.G.S. 7.5 MINUTE QUADRANGLE
PHOTOREVISED 1978

0' 1000' 2000'
SCALE 1:24,000
1" = 2000'
CONTOUR INTERVAL 20 FEET

UTAH
QUADRANGLE LOCATION

SLC4Q073.ppt

KLEINFELDER

Date: 04/01/2004
Project Number 12935.001

Iron County Landfill - Armstrong Pit
Iron Springs, Utah

SITE LOCATION MAP

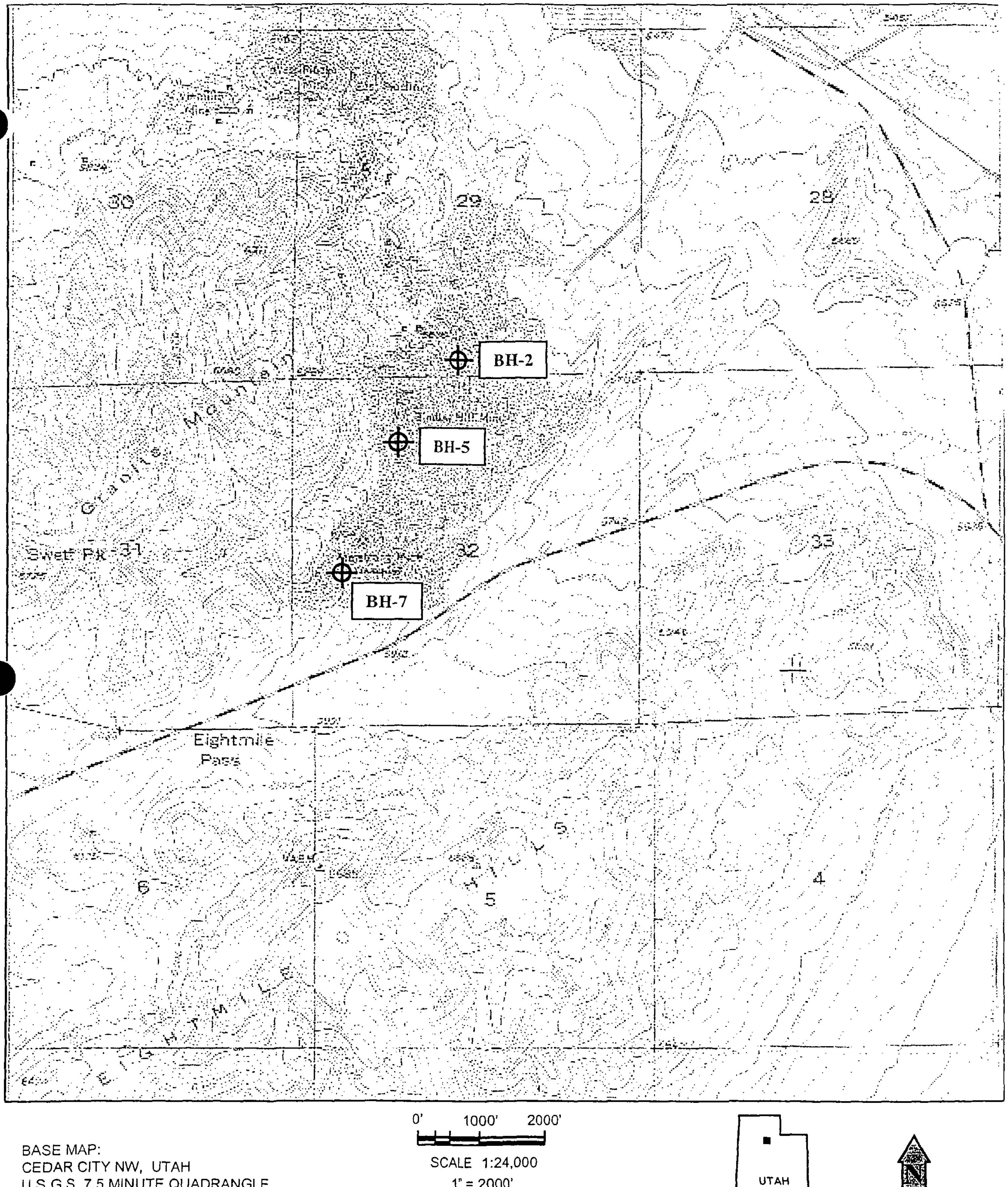
FIGURE
1

A statistical analysis of the groundwater data generated prior to waste placement at the Iron County Landfill was completed by Kleinfelder in a previous report (Kleinfelder, 1999). This report assessed the "background" (pre-waste) groundwater quality at the landfill, and generated proposed "prediction limits" for the various analytes based on accepted statistical techniques (ASTM, 1996; ASTM, 1998). Those prediction limits, generated using the background data, are used to assess whether a significant change in groundwater quality has occurred during the period of waste placement into the Iron County Landfill, as required under the detection monitoring program.

Due to the detection of low concentrations of organic compounds during 2001 in well BH-5, the State of Utah Division of Solid and Hazardous Waste (DSHW) has required the initiation of "assessment monitoring" at that well. This has entailed the analysis of additional parameters from well BH-5, as well as a quarterly sampling frequency as required by R315-308-2 (10) and (11). Assessment monitoring results from well BH-5 are discussed in more detail, along with the detection monitoring results from wells BH-2 and BH-7, in Section 3 of this report.

2.3 GROUNDWATER SAMPLING SUMMARY

The locations of the three wells used for groundwater monitoring at the Iron County Landfill, BH-2, BH-5, and BH-7, are shown on Figure 2 (Monitoring Well Locations). Groundwater sampling has been conducted according to the applicable Groundwater Monitoring Plan that was incorporated as part of the original Solid Waste Permit (Tahoma, 1992). Since March 1999 samples have been collected by Iron County personnel using low flow ("micropurging") techniques wherein each well contains a dedicated low-volume pump operated by a portable cylinder of compressed gas. Samples are collected upon stabilization of physical parameter groundwater measurements during well purging. The methodology for sample collection using the micropurging technique is described in more detail in Appendix A, Sampling Activities Protocol.



BASE MAP:
CEDAR CITY NW, UTAH
U.S.G.S. 7.5 MINUTE QUADRANGLE
PHOTOREVISED 1978

SCALE 1:24,000
1" = 2000'
CONTOUR INTERVAL 20 FEET

SLC4Q074.ppt

KLEINFELDER

Date: 04/01/2004
Project Number 12935.001

Iron County Landfill - Armstrong Pit
Iron Springs, Utah

MONITORING WELL LOCATIONS

FIGURE

2

Since the groundwater regime at the Iron County Landfill appears to be discontinuous in nature, intra-well comparisons have been used to monitor the groundwater quality (i.e., data from the various sampling events are compared with previous results from the same well rather than against other wells). Intra-well comparisons have been made by comparing data from post-background sampling against data considered as part of the background population from that well.

This report discusses the groundwater quality and any significant changes for the two most recent semiannual sampling events conducted in 2003, including the assessment monitoring data from well BH-5. For comparison purposes, all of the groundwater data collected from wells BH-2, BH-5, and BH-7 since 1992 are tabulated and presented in this report. However, emphasis will be placed on the detection and assessment monitoring sampling events conducted in calendar year 2003 and any groundwater changes noted during that time period.

3. GROUNDWATER ASSESSMENT

3.1 GROUNDWATER LEVEL MEASUREMENTS AND ELEVATIONS

Depth-to-water measurements have been recorded for wells BH-2, BH-5, and BH-7 during all sampling events at the Iron County Landfill following the protocol described in Appendix A, Sampling Activities Protocol. Depth-to-groundwater measurements are converted to groundwater elevations above mean sea level (msl) for the three wells by subtracting the measured depths from the surveyed well casing elevations. Groundwater elevation data from the 2003 sampling events (including two detection monitoring events at all three wells, and two assessment monitoring events at well BH-5 only), as well as historical data from previous events, are shown on Table 1, Depth to Water and Groundwater Elevations, February 1992 to December 2003.

Groundwater elevations calculated from the measurements at the landfill do not fit typical groundwater aquifer regimes since the three wells penetrate three distinct rock types and what appear to be three separate aquifers (Tahoma, 1997). This type of groundwater regime does not allow a realistic determination of a groundwater gradient and flow direction (i.e., "upgradient" and "downgradient" directions). As such, no meaningful groundwater surface contour map can be generated from the data, nor local groundwater velocities estimated. However, the following can be noted regarding groundwater elevations in the three wells:

- Groundwater elevations in wells BH-5 and BH-7 are historically similar, typically ranging from 5,474 to 5,489 feet above msl. The groundwater elevation in BH-2 is approximately 80 to 100 feet lower, ranging from a historical high of 5,401 feet above msl measured in March 1993, to a low of 5,372 feet above msl (April 2002).

- Similar to 2002, little seasonal groundwater elevation change was noted during 2003 in the sampled wells. The greatest seasonal variation was noted in well BH-5, where water levels ranged from 5474.8 feet to 5477 feet above msl. In general, groundwater elevations tend to be highest in the spring months and lowest in the fall at the Armstrong Pit.

- The groundwater elevation measured in all three wells during the April 2002 sampling event were the lowest levels recorded since the inception of groundwater monitoring in 1992. However, after a period of general decline, groundwater levels at the Iron County Landfill held relatively steady or rebounded from 2002 to 2003. Groundwater elevations in well BH-2 increased about 19 feet from September 2002 to March 2003. This may be attributable to a period of above normal precipitation in the region during the fall and early winter 2002-03.

3.2 GROUNDWATER SAMPLING AND ANALYSIS FOR 2003

Groundwater samples were collected by Iron County personnel according to the protocol described in Appendix A on March 4, June 17, October 2, and December 18, 2003. During the June 17 and December 18 sampling events, groundwater samples were collected only from well BH-5 as part of the required quarterly assessment monitoring program for that well. The groundwater samples from wells BH-2 and BH-7 were submitted for analysis of the constituents listed in Table 2a, Laboratory Analyses for Semi-Annual Monitoring. The samples submitted from well BH-5 were submitted for the constituents listed in Table 2b, Laboratory Analyses for Assessment Monitoring.

Field parameter measurements were made at the time of sampling, including pH, temperature, and specific conductivity. These field measurements are included in Table 3, Field Measurements Summary, which includes the field data from all monitoring events conducted at the landfill for comparison purposes. Note that the specific conductivity measurements recorded by Iron County personnel during the March 2003 sampling event were anomalously high in wells

BH-2 and BH-5, possibly indicating a malfunctioning probe, an error in calibration, or compromised calibration standards.

The physical parameter measurements have historically been similar in wells BH-2 and BH-5. The specific conductivity measurements in well BH-5 gradually increased between 1996 and 2001, indicating an increasing concentration of dissolved solids in that well for that time period. The conductivity measurements in that well during 2003 was similar to measurements recorded in previous years, indicating a stabilization of dissolved solids content during this reporting period.

Conductivity measurements from well BH-7 indicate that slightly different aquifer conditions exist in this well with respect to the dissolved solids content of the groundwater. The specific conductivity measured in well BH-7 has historically been approximately 25 to 30 percent less than in wells BH-2 and BH-5, indicating a lower concentration of dissolved solids in BH-7 than in the other two monitored wells.

3.3 GROUNDWATER ANALYTICAL RESULTS SUMMARY

3.3.1. General

This section summarizes the analytical results for the March, June, October, and December 2003 sampling events conducted at the Iron County Municipal Landfill. Analytical results for the groundwater sampling are presented in Tables 4 through 8, which present the results of the volatile organic compounds (VOCs), metals, miscellaneous inorganic analyses, pesticides/ herbicides, and semi-volatile organic compounds (SVOCs), respectively.

The method detection limits (MDLs) and practical quantitation limits (PQLs) for the analyzed parameters, both organic and inorganic, are shown on the respective summary tables. The current Groundwater Protection Standards (GWPSs) for each analyte, where established, are also shown on the analytical results summary tables.

A summary of the 2003 groundwater sampling results by analyte type is presented in the following sections. Copies of the laboratory reports from all four 2003 sampling events have been included with this report in Appendix B.

3.3.2. Organics

In general, volatile organic compounds have not been detected in significant concentrations or duration at the Iron County Landfill. Only a few organic compounds have ever been detected above their respective reporting limits, most of which have been detected in well BH-5. However, the persistent detection of low concentrations of two VOCs during 2000 and 2001 sampling events (1,1-dichloroethane [1,1-DCA] and 1,1-dichloroethene [1,1-DCE]) in well BH-5 has required the initiation of assessment monitoring in that well. Consequently, additional analytes and a quarterly sampling schedule are now required for that well.

Historical analytical results for the organic compound analyses are shown on Table 4, Volatile Organics Results Summary, including those for the 2003 detection and assessment monitoring events. No organic compounds above their reporting limits were detected in wells BH-2 or BH-7 during either semiannual sampling event in 2003. The following summarize the VOC results in well BH-5 in 2003:

- 1,1-DCA was detected during three of the four sampling events at concentrations of 1.2 to 2.0 micrograms per liter (µg/L), both just above the limit of 1.0 µg/L. These concentrations are similar to those reported for sampling events over the last two years; i.e., the concentration of 1,1-DCA does not appear to be increasing in well BH-5.

- Tetrachloroethene (PCE) was detected at the reporting limit of 1.0 ug/L in well BH-5 during the June 2003 sampling event. This is the first reported detection of this compound at the Iron County Landfill since March 1999, when it was detected in well BH-5 at a concentration of 0.69 ug/L.

- None of the 12 additional volatile compounds required for assessment monitoring were detected above their respective reporting limits in well BH-5 during assessment monitoring in 2003.

- 1,1-DCE, which has been detected previously in well BH-5, was not detected during assessment monitoring in 2003.

The organic analytes 1,2-dibromo-3-chloropropane and 1,2-dibromoethane have extremely low Groundwater Protection Standards of 0.2 μg/L and 0.05 μg/l, respectively, and consequently very low required reporting limits. As of September 2002, EPA Method 504 has been used as the analysis method to achieve the required detection limit(s) for these two compounds. The reporting limit for these two compounds is now 0.01 ug/L as a result of using Method 504.

3.3.3. Metals

Groundwater samples were analyzed for total concentrations of criteria pollutant and other general metals during the 2003 groundwater sampling events. Of the 18 metals that have been monitored at the Armstrong Pit, beryllium, cadmium, cobalt, and mercury have never been detected at the landfill at concentrations above their respective reporting limits. However, silver was reported in well BH-7 above the reporting limit during the October 2003 sampling event for the first time since monitoring was initiated in 1992. Of the other metals analyzed, only arsenic, chromium, and lead have been detected above their respective GWPSs; these detections all occurred from 1992 to 1994, prior to the placement of waste into the Armstrong Pit. Historical and recent results for metals analyses at the landfill are included in Table 5, Metals Results Summary. The following summarize the metals sampling results for 2003:

- Reported concentrations of vanadium were slightly elevated in all three wells during the October 2003 sampling event. Vanadium was detected slightly above the reporting limit of 5.0 ug/L for the first time in well BH-2 at a concentration of 5.3 ug/L. The detected concentration of vanadium in well BH-7 during that event (9.6 ug/L) was the highest reported since 1998.

- Manganese was not a requested analyte between March 1999 and April 2002. Although detected manganese concentrations have historically been less than 150 ug/L in BH-5, concentrations up to 280 ug/L were detected in that well in 2003. These reported concentrations are similar to those detected in 2002. No GWPS is established for manganese, and this element is not tracked statistically.

- Tin is a required analyte for assessment monitoring, and was requested for the BH-5 samples submitted for all four sampling events at that well in 2003. This analyte was first requested in July 2002. Tin was not detected above the reporting limit (PQL) of 500 ug/L. No GWPS has been established for this element.

The reporting limits (MDLs and PQLs) provided by American West Analytical Laboratory for antimony, cadmium, and thallium in 2003 are close to the GWPS for these elements. Different analytical methods, if feasible, will be requested for future sampling events to allow lower reporting limits for these analytes.

3.3.4. Miscellaneous Inorganic Analyses

No GWPS has been established for the miscellaneous inorganic constituents and, as such, no statistical analysis is required and no prediction limits have been established. These parameters are included here, however, to provide information on general chemistry and spatial variability of the local groundwater.

The historical and recent analytical results for the miscellaneous inorganic parameters are presented in Table 6, Miscellaneous Inorganic Results Summary. The following summarize the 2003 monitoring results for these parameters:

- Bicarbonate (HCO_3-) concentrations remain slightly elevated in well BH-5 for all four assessment sampling events as compared to historic results.

- The detected concentrations of ammonia are slightly elevated with respect to past sampling results in wells BH-2 and BH-5 in 2003.

- Cyanide is now a requested parameter for well BH-5 as part of the assessment monitoring for that well. Cyanide was not detected above the reporting limit of 5 ug/L in BH-5 during any of the quarterly monitoring events in 2003.

- Miscellaneous inorganic results for 2003 are generally consistent with past sampling results.

3.3.5 Assessment Monitoring Parameters

As noted previously, the detection of several organic compounds in well BH-5 above the established prediction limits has required assessment monitoring in that well. Assessment monitoring sampling was conducted at BH-5 on March 4, June 17, October 2, and December 18, 2003. The initiation of assessment monitoring requires more frequent sampling (quarterly rather than semiannually) and the analysis of additional parameters as stipulated in R307-308-2(11). The required sampling parameters for assessment monitoring are noted in Appendix II of 40CFR Part 258. These required analytes include, in addition to those already discussed in Sections 3.3.2 through 3.3.4 for detection monitoring, the following:

- Pesticides by EPA Method 8081A;
- Herbicides by EPA Method 8151A;
- Twelve (12) additional VOCs by EPA Method 8260B; and
- Semivolatile organic compounds (SVOCs) by EPA Method 8270.

The following paragraphs discuss the results of the assessment monitoring sampling events at well BH-5 for the additional parameters.

Pesticide Analyses. Samples from well BH-5 were submitted for analysis of sixteen common pesticides by EPA Method 8081A for all four assessment monitoring events in 2003. As shown on Table 7, Pesticides and Herbicides Results Summary, pesticides were not detected above the respective reporting limits.

Herbicide Analyses. Samples from well BH-5 were submitted for analysis of three common herbicides (2,4-D, 2,3,5-TP, and 2,3,5-T) by EPA Method 8151A during BH-5 assessment monitoring in 2003. As shown on Table 7, herbicides were not detected above the reporting limit of 1.0 ug/L.

Additional VOC Analyses. In addition to the volatile compounds required under the detection monitoring program, an additional 12 compounds are required under Appendix II for assessment monitoring, including several chloropropane/propene isomers, two acrylate compounds, acetonitrile, and naphthalene among others. Analytical results of the 2003 assessment monitoring for these compounds are presented in Table 4, Organic Results Summary, with the remainder of the required volatile organic compounds. None of the Appendix II volatile organic compounds were detected above their respective reporting limits in 2003.

SVOC Analyses. Under assessment monitoring, more than 100 semivolatile compounds are required for analysis as designated in 40CFR Part 258, Appendix II. These compounds, and the 2003 sampling results, are presented in Table 8, Semivolatile

Organic Results Summary. Of these compounds, only pentachlorophenol was detected in BH-5 above the reporting limit of 1.0 ug/L. This reported detection, at a concentration of 1.9 ug/L, was reported in the sample collected on December 18, 2003. This compound was not detected in any of the other three assessment sampling events in 2003. Subsequent 2004 sampling events will be monitored for any further detections of this compound.

3.4 COMPARISON OF 2003 SEMIANNUAL RESULTS WITH ESTABLISHED PREDICTION LIMITS

The results of post-background sampling events at the Iron County Landfill are evaluated for statistically significant changes by:

- Comparing the 2003 sample results to the established prediction limits, as described in Appendix C, for those analytes that were detected 25 percent of the time or less during the background period, or

- Comparing normalized concentrations (Z_i) and cumulative increases (S_i) by means of Shewart-CUSUM charts (also described in Appendix C) against control limits for each parameter detected more than 25% of the time during the background sampling.

The individual Shewart-CUSUM charts, as updated with the 2003 detection and assessment sampling data, are included with this report in Appendix D. Only charts for those parameters required for statistical evaluation (and detected more than 25% of the time during background sampling) have been included with this report. Control charts are included for the following parameters:

- Antimony (well BH-2);
- Arsenic (all wells);
- Barium (all wells);
- Chromium (wells BH-5 and BH-7);

- Copper (wells BH-2 and BH-5);
- Lead (all wells);
- Selenium (wells BH-2 and BH-7); and
- Zinc (all wells).

The following sections discuss the parameters that are approaching or have exceeded the established prediction limits, if any, during the 2003 groundwater sampling. For ease of comparison, the prediction limits used for each parameter have been included on Tables 4 and 5 for each well except where tracked using Shewart-CUSUM charts. Note that those analyte concentrations exceeding their prediction limits, either non-parametric or Shewart-CUSUM, are indicated in red on the respective results summary table(s).

3.4.1 Volatile Organics

Prediction limits for volatile organic compounds are set at the method PQL for all parameters since organic compounds have been detected only infrequently during the background sampling period. The respective prediction limits for all required organic compounds are shown on Table 4, Volatile Organic Results Summary, and discussed in Appendix C.

No volatile organic compounds were detected at or above their respective PQLs (i.e., prediction limits) during 2003 with the exception of 1,1-DCE and PCE. Although these compounds were detected at or above the prediction limit of 1.0 ug/L, the detected concentrations remain relatively low as compared to their GWPS values of 7.0 ug/L and 5.0 ug/L for 1,1-DCE and PCE, respectively. The detected concentrations of 1,1-DCE in well BH-5 do not appear to be increasing during the assessment monitoring events

3.4.2 Metals

No metals were noted above their respective prediction limits for any of the sampling events at the Iron County Landfill in 2003. The reporting limit for antimony of 5 ug/L for the July and September sampling events is, however, higher than the established prediction limit for wells BH-5 and BH-7 of 1 ug/L, but lower than the GWPS of 6 ug/L.

Previously out-of-control concentrations of chromium and selenium, as tracked using Shewart-CUSUM methods in previous groundwater monitoring reports, were within control limits following the inclusion of additional data in the background population in 2000, as discussed in Appendix C.

3.4.3 General Inorganic Parameters

Since no GWPS has been established for the general inorganic parameters analyzed as part of the semiannual groundwater sampling (Table 6), no statistical evaluation is required for these parameters. These include ammonia, carbonate/bicarbonate, pH, calcium, potassium, chloride, sodium, iron, sulfate, magnesium, manganese, nitrate, nitrite, total dissolved solids, and total organic carbon. These parameters are analyzed to provide information on the general chemistry and variability of the local groundwater, and serve as indicators of degradation and groundwater mixing.

3.5 QUALITY CONTROL ASSESSMENT

3.5.1 QA/QC Procedures

Several standard quality assurance/quality control (QA/QC) procedures were employed on the part of the laboratory during analysis of the groundwater samples sampled at the Iron County Landfill. These laboratory procedures included:

- Method Blanks (MB) - Method blanks provide information on possible cross-contamination of samples during laboratory preparation and analysis, and consist aliquots of purified water that are prepared (filtered, digested, titrated, etc.) along with the submitted samples.

- Laboratory Check Samples (LCS) – A LCS is analyzed as part of each batch of submitted samples to verify the accuracy of the analytical equipment. A LCS is prepared separately with a known concentration of the analyte or analytes.

- Matrix Spikes (MS) – Matrix spikes are used to test for matrix interference in the submitted samples. A known concentration of a given analyte or analytes is added to an aliquot from a submitted sample, and the subsequent concentration compared to the original amount added. Poor recovery of the "spiked" amount indicates a sample matrix that is causing interference with the analytical equipment.

- Matrix Spike Duplicate (MSD) – Similar to matrix spikes, matrix spike duplicates are used to test for matrix interference in the analyzed samples.

- Duplicates (Dups) – Laboratory duplicate samples are a separate aliquot prepared from the same sample container as submitted by the client. They are prepared and analyzed as a separate sample, and the results for the original sample and the duplicate sample are compared to verify the ability of the sample method and analytical equipment to replicate the sample result.

The results of the quality control samples are included with the rest of the analytical data on the laboratory reports included in Appendix B.

3.5.2 QA/QC Results Summary

The quality control procedures employed for the samples submitted from the Iron County Landfill in 2003 showed no significant problems with the samples or laboratory procedures or equipment. The following were noted in the quality control reports for all sampling episodes:

- Matrix interference was commonly noted during analysis of various parameters including several metals, chemical oxygen demand (COD), and general chemistry parameters.

- Sample inhomogeneity was noted as a cause for variance of several MS and MSDs.

- The concentrations of several analytes in the submitted samples were too high for acceptable MS and MSD recoveries during all sampling events.

The results of the QA/QC samples submitted for the 2003 sampling events indicate that no significant contamination is being introduced as a part of laboratory preparation and analysis. In addition, sample preparation and analytical equipment are within specifications for the requested analytes at the contracted laboratory

4. CONCLUSIONS

Data generated from groundwater sampling events at the current Iron County Landfill during the background sampling period of February 1992 to March 1994 have been used to establish background concentrations for each of the analytes required for detection monitoring. In addition to the samples collected prior to waste placement, sample results obtained during the approximately two-year period (fall 1994 to fall 1996) following waste placement have, in some instances, been included with the background population. Increasing the number of background samples allows a greater confidence in avoiding false positive or false negative results during subsequent semiannual detection monitoring.

Since the groundwater regime at the Iron County Landfill appears to be discontinuous in nature, intra-well comparisons have been used to monitor the groundwater quality (i.e., data from the various sampling events are compared with previous results from the same well rather than against other wells). Intra-well comparisons have been made by comparing data from post-background sampling against data considered as part of the background population from that well.

Due to the detection of low concentrations of organic compounds during 2001 in well BH-5, the Utah DSHW has required the initiation of assessment monitoring at that well. This has entailed the analysis of additional parameters from well BH-5, as well as a quarterly sampling frequency as per requirements of R315-308-2 (10) and (11).

Based on collected background groundwater data and comparison of that data with recent groundwater sampling data generated during 2003, the following conclusions can be made regarding the current groundwater quality at the Iron County Landfill:

VOCs are not a significant contaminant of concern at the landfill. No volatile organic compounds were detected at or above their respective prediction limits during 2003 with the exception of 1,1-DCE and PCE. Both compounds were detected in well BH-5 at or above the prediction limits during 2003, but the reported concentrations are low as compared to the established Groundwater Protection Standards for these compounds.

All metallic analytes were in control for all 2003 sampling events. The reported vanadium concentration in well BH-2 during the October 2003 sampling event was slightly elevated above the reporting limit for the first time since background sampling. Both vanadium and silver concentrations were slightly elevated in well BH-7 during that sampling event, although vanadium has been detected above the reporting limit in well BH-7 in the past.

General groundwater chemistry remains unchanged. Results of the analysis of miscellaneous inorganic parameters indicate that little or no significant changes in groundwater chemistry have occurred during this monitoring period.

Pesticides and herbicides are not currently contaminants of concern. No pesticides or herbicides were reported in well BH-5 above their reporting limits during assessment monitoring in 2003, nor were they detected in 2002.

Semivolatile organics are not currently contaminants of concern. Of the more than 100 semivolatile compounds required for analysis, only pentachlorophenol was detected during assessment monitoring in well BH-5 above its reporting limit. This compound, detected in the sample collected in December 2003 just above the reporting limit, was not detected during any other sampling event for this reporting period.

Detection monitoring is ongoing at the Iron County Landfill with groundwater sampling events conducted semi-annually in the spring and in the fall. In addition, quarterly sampling is being conducted for well BH-5 as part of the required assessment monitoring program for that well. Subsequent annual groundwater monitoring reports will be submitted to address the sampling results from the sampling rounds conducted during each calendar year.

5. LIMITATIONS

The findings, conclusions, and recommendations presented in this report are based upon information presented to Kleinfelder by others. Information for this report has been provided by:

- Geologic and hydrologic reports prepared by other consulting firms;
- Laboratory data provided to Kleinfelder by Iron County personnel;
- Field data collected by Iron County personnel, and
- Results of analyses by a commercial analytical laboratory.

This report was prepared in general accordance with the accepted standard of care existing at the time the work was performed. It should be recognized that the definition and evaluation of hydrogeologic conditions is a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the subsurface and/or historic conditions applicable to the site. More detailed, focused and/or extensive studies including additional subsurface assessments can tend to reduce the inherent uncertainties associated with evaluation of environmental conditions.

Data may be developed in the future that would lead to modifications of the conclusions contained herein. Kleinfelder reserves the right to modify the report should additional data become available that would indicate that such modifications are needed to accurately reflect the conditions found.

6. REFERENCES

ASTM, 1996. Provisional Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs; American Society for Testing and Materials (ASTM) Designation PS 64-96, May 7, 1996.

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Kleinfelder, 1999. Groundwater Monitoring Report, 1992-1998: Iron County Municipal Landfill, Armstrong Pit, Iron County, Utah; Kleinfelder, Inc., June 1999.

Tahoma, 1992. Groundwater Monitoring Plan – Addendum to the Ground Water Discharge Permit Application, Proposed Armstrong Pit Landfill Site; Tahoma Resources, August 1991, Revised January 1992.

Tahoma, 1997. Groundwater Analysis for Iron County; Tahoma Companies, Inc., March 1997.

TABLE 1
Depth To Water and Groundwater Elevations
February 1992 to December 2003
Iron County Landfill - Armstrong Pit

Well ID	Date Measured	Depth To Water (Top of Casing)	Casing Elevation (MSL)	Groundwater Elevation (MSL)
BH-2	2/26/1992	263.9	5652.2	5388.3
	3/29/1992	261.3	5652.2	5390.9
	4/29/1992	261.3	5652.2	5390.9
	5/18/1992	264.0	5652.2	5388.2
	8/18/1992	267.0	5652.2	5385.2
	11/16/1992	273.0	5652.2	5379.2
	3/22/1993	251.5	5652.2	5400.7
	10/9/1993	257.0	5652.2	5395.2
	3/17/1994	263.4	5652.2	5388.8
	4/18/1995	254.1	5652.2	5398.1
	9/28/1995	265.0	5652.2	5387.2
	3/4/1996	268.6	5652.2	5383.6
	9/25/1996	271.6	5652.2	5380.6
	3/10/1997	269.2	5652.2	5383.0
	9/8/1997	269.8	5652.2	5382.4
	3/18/1998	264.2	5652.2	5388.0
	9/30/1998	260.9	5652.2	5391.3
	3/3/1999	251.0	5652.2	5401.2
	11/21/1999	256.0	5652.2	5396.2
	4/10/2000	269.9	5652.2	5382.3
	9/25/2000	275.7	5652.2	5376.5
	4/17/2001	274.3	5652.2	5377.9
	10/24/2001	275.9	5652.2	5376.3
	4/24/2002	279.7	5652.2	5372.5
	9/30/2002	279.0	5652.2	5373.2
	3/4/2003	**260.1**	5652.2	**5392.1**
	10/2/2003	**261.1**	5652.2	**5391.1**

TABLE 1
Depth To Water and Groundwater Elevations
February 1992 to December 2003
Iron County Landfill - Armstrong Pit

Well ID	Date Measured	Depth To Water (Top of Casing)	Casing Elevation (MSL)	Groundwater Elevation (MSL)
BH-5	2/26/1992	378.1	5857.0	5478.9
	3/29/1992	377.5	5857.0	5479.5
	4/29/1992	377.5	5857.0	5479.5
	5/19/1992	377.5	5857.0	5479.5
	8/19/1992	378.1	5857.0	5478.9
	11/16/1992	378.5	5857.0	5478.5
	3/19/1993	375.1	5857.0	5481.9
	10/9/1993	369.9	5857.0	5487.1
	3/17/1994	369.4	5857.0	5487.6
	4/17/1995	N/A*	5857.0	N/A*
	9/27/1995	370.3	5857.0	5486.7
	3/4/1996	370.7	5857.0	5486.3
	9/25/1996	371.7	5857.0	5485.3
	3/10/1997	372.0	5857.0	5485.0
	9/8/1997	373.2	5857.0	5483.8
	3/18/1998	374.0	5857.0	5483.0
	9/30/1998	373.4	5857.0	5483.6
	3/3/1999	375.1	5857.0	5481.9
	11/21/1999	375.2	5857.0	5481.8
	4/10/2000	370.6	5857.0	5486.4
	9/25/2000	368.0	5857.0	5489.0
	4/17/2001	377.7	5857.0	5479.3
	10/24/2001	380.4	5857.0	5476.6
	4/24/2002	384.1	5857.0	5472.9
	7/30/2002	382.5	5857.0	5474.5
	9/30/2002	383.0	5857.0	5474.0
	3/4/2003	**380.0**	5857.0	**5477.0**
	6/17/2003	**381.0**	5857.0	**5476.0**
	10/2/2003	**382.2**	5857.0	**5474.8**
	12/18/2003	**380.0**	5857.0	**5477.0**

TABLE 1
Depth To Water and Groundwater Elevations
February 1992 to December 2003
Iron County Landfill - Armstrong Pit

Well ID	Date Measured	Depth To Water (Top of Casing)	Casing Elevation (MSL)	Groundwater Elevation (MSL)
BH-7	2/26/1992	444.3	5923.7	5479.4
	3/29/1992	443.1	5923.7	5480.6
	4/29/1992	443.3	5923.7	5480.4
	5/18/1992	443.5	5923.7	5480.2
	8/18/1992	444.3	5923.7	5479.4
	11/17/1992	444.7	5923.7	5479.0
	3/20/1993	439.6	5923.7	5484.1
	10/8/1993	435.5	5923.7	5488.2
	3/18/1994	435.7	5923.7	5488.0
	4/18/1995	436.9	5923.7	5486.8
	9/27/1995	437.4	5923.7	5486.3
	3/4/1996	438.6	5923.7	5485.1
	9/25/1996	439.1	5923.7	5484.6
	3/10/1997	439.5	5923.7	5484.2
	9/9/1997	440.4	5923.7	5483.3
	3/18/1998	441.0	5923.7	5482.7
	9/30/1998	440.3	5923.7	5483.4
	3/3/1999	439.4	5923.7	5484.3
	11/21/1999	439.0	5923.7	5484.7
	4/10/2000	439.7	5923.7	5484.0
	9/26/2000	434.6	5923.7	5489.1
	4/17/2001	444.7	5923.7	5479.0
	10/24/2001	446.0	5923.7	5477.7
	4/24/2002	449.8	5923.7	5473.9
	9/30/2002	448.3	5923.7	5475.4
	3/4/2003	**448.9**	5923.7	**5474.8**
	10/2/2003	**449.7**	5923.7	**5474.0**

* N/A = data not collected or not available

Data in bold are those collected during this report period.

TABLE 2a

LABORATORY ANALYSES FOR SEMI-ANNUAL GROUNDWATER MONITORING
IRON COUNTY LANDFILL – CEDAR CITY, UTAH

Detection Monitoring - Required Analytes

Miscellaneous Inorganic Analytes

Bicarbonate as $CaCO_3$
Carbonate as $CaCO_3$
Sulfate
Chloride
Calcium (Dissolved)
Potassium (Dissolved)
Sodium (Dissolved)
Magnesium (Dissolved)
Total Organic Carbon (TOC)
Ammonia as N
Nitrate as N
Nitrite as N
Total Dissolved Solids (TDS)
pH

Metals

Antimony (Total)
Arsenic (Total)
Barium (Total)
Beryllium (Total)
Cadmium (Total)
Chromium (Total)
Cobalt (Total)
Copper (Total)
Iron (Total)
Lead (Total)
Manganese (Total)
Mercury (Total)
Nickel (Total)
Selenium (Total)
Silver (Total)
Thallium (Total)
Vanadium (Total)
Zinc (Total)

Organics

Volatile Organics (EPA 8260 or 504)

TABLE 2b

LABORATORY ANALYSES FOR ASSESSMENT MONITORING
IRON COUNTY LANDFILL – CEDAR CITY, UTAH

Miscellaneous Inorganic Analytes

Bicarbonate as $CaCO_3$
Carbonate as $CaCO_3$
Sulfate
Sulfide
Chloride
Cyanide
Calcium (Dissolved)
Potassium (Dissolved)
Sodium (Dissolved)
Magnesium (Dissolved)
Total Organic Carbon (TOC)
Ammonia as N
Nitrate as N
Total Dissolved Solids (TDS)
Chemical Oxygen Demand (COD)
pH

Metals

Antimony (Total)
Arsenic (Total)
Barium (Total)
Beryllium (Total)
Cadmium (Total)
Chromium (Total)
Cobalt (Total)
Copper (Total)
Iron (Total)
Lead (Total)
Manganese (Total)
Mercury (Total)
Nickel (Total)
Selenium (Total)
Silver (Total)
Thallium (Total)
Tin (Total)
Vanadium (Total)
Zinc (Total)

Organics

Volatile Organics (EPA 8260/504)
Semivolatile Organics (EPA 8270C/3510C)
Pesticides (EPA 8081A/3510C)
Herbicides (EPA 8151A)
EDB and DBCP (EPA 504)

TABLE 3
Field Measurements Summary
Iron County Landfill - Armstrong Pit
March 1992 - December 2003

Well ID	Date Measured	pH	Temperature (^oF)	Specific Conductance (umhos)
BH-2	3/29/1992	11.9	65.5	1503
	4/29/1992	12.0	69.0	1502
	5/19/1992	11.7	61.8	1100
	8/18/1992	11.3	64.0	1275
	11/16/1992	9.5	61.0	1357
	3/22/1993	11.8	63.1	1240
	10/9/1993	11.7	62.2	1635
	3/17/1994	8.9	65.4	1701
	4/18/1995	9.2	63.8	1045
	9/28/1995	11.1	62.0	1091
	3/4/1996	10.3	57.8	926
	9/25/1996	7.5	68.7	1095
	3/12/1997	8.1	61.4	1022
	9/9/1997	n/a*	n/a*	n/a*
	3/18/1998	10.9	56.7	910
	9/30/1998	8.4	64.9	1364
	3/3/1999	7.53	59.7	1145
	11/21/1999	n/a*	n/a*	n/a*
	4/10/2000	7.0	55.6	1249
	9/25/2000	8.7	61.7	1186
	4/17/2001	13.8**	59.3	1207
	10/24/2001	14.2**	58.2	1020
	4/24/2002	7.6	57.9	1223
	9/30/2002	7.6	61.5	2675**
	3/4/2003	**6.6**	**53.8**	**2376****
	10/2/2003	**7.5**	**64.8**	**1063**

TABLE 3
Field Measurements Summary
Iron County Landfill - Armstrong Pit
March 1992 - December 2003

Well ID	Date Measured	pH	Temperature (°F)	Specific Conductance (umhos)
BH-5	3/29/1992	8.6	68.3	857
	4/29/1992	8.2	69.0	808
	5/19/1992	8.2	62.9	858
	8/19/1992	8.0	71.0	930
	11/16/1992	8.3	61.0	972
	3/19/1993	8.3	60.0	980
	10/9/1993	8.3	61.0	918
	3/17/1994	8.0	78.4	107
	4/17/1995	n/a*	n/a*	n/a*
	9/27/1995	7.1	63.3	789
	3/4/1996	6.3	61.8	713
	9/25/1996	7.3	65.7	795
	3/11/1997	7.5	62.0	820
	9/10/1997	7.0	66.0	912
	3/18/1998	7.1	59.6	880
	9/30/1998	6.8	66.0	1022
	3/3/1999	7.1	60.6	1127
	11/21/1999	7.0	59.8	1087
	4/10/2000	7.0	59.3	1138
	9/25/2000	9.1	61.6	1163
	4/17/2001	13.8**	58.3	1167
	10/24/2001	13.6**	59.7	1161
	4/24/2002	7.4	60.4	1157
	7/30/2002	7.5	62.2	2034**
	9/30/2002	7.1	62.0	2261**
	3/4/2003	**6.3**	**59.1**	**2295****
	6/17/2003	**7.0**	**63.8**	**1103**
	10/2/2003	**7.3**	**63.7**	**1062**
	12/18/2003	**7.0**	**63.1**	**1100**

TABLE 3
Field Measurements Summary
Iron County Landfill - Armstrong Pit
March 1992 - December 2003

Well ID	Date Measured	pH	Temperature (^oF)	Specific Conductance (umhos)
BH-7	3/29/1992	7.2	66.7	650
	4/29/1992	7.7	71.0	702
	5/18/1992	7.9	69.0	674
	8/18/1992	8.0	70.0	730
	11/17/1992	8.4	64.0	750
	3/20/1993	7.8	66.5	850
	10/8/1993	9.9	60.1	1010
	3/18/1994	7.8	53.6	1640
	4/18/1995	7.3	61.8	680
	9/27/1995	6.3	67.1	714
	3/4/1996	5.8	60.0	641
	9/25/1996	7.7	72.4	738
	3/11/1997	6.5	65.6	690
	9/9/1997	7.6	67.9	702
	3/18/1998	7.4	57.0	625
	9/30/1998	7.1	72.5	832
	3/3/1999	7.6	59.5	715
	11/21/1999	6.9	59.2	761
	4/10/2000	7.5	58.2	790
	9/26/2000	9.2	59.0	792
	4/17/2001	13.5**	59.1	795
	10/24/2001	14.1**	59.2	783
	4/24/2002	7.9	56.1	796
	9/30/2002	7.6	60.5	1918**
	3/4/2003	**6.3**	**47.8**	**777**
	10/2/2003	**7.8**	**61.2**	**723**

*n/a = data not collected or not available

Data in bold are those collected during this reporting period

** = Suspect Datum

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Bromomethane (ug/L)	Vinyl Chloride (ug/L)	Chloroethane (ug/L)	Methylene Chloride (ug/L)	Acrylonitrile (ug/L)	Acetone (ug/L)	Carbon Disulfide (ug/L)	Dichlo (u
BH-2	5/19/1992	<10	<10	<10	<5	<10	<5	<5	
	8/18/1992	<10	<10	<10	<5	<10	<5	<5	
	11/16/1992	<10	<10	<10	<5	<10	<5	<5	
	10/9/1993	<10	<10	<10	<5	<10	4	<5	
	3/17/1994	<10	<10	<10	<5	<10	8*	8*	
	4/18/1995	<10	<10	<10	<5	<100	<10	<5	
	9/28/1995	<10	<10	<10	<5	<100	<10	<5	
	3/4/1996	<10	<10	<10	<5	<100	<10	<5	
	9/25/1996	<10	<10	<10	<5	<100	<10	<5	
	3/10/1997	<10	<10	<10	<5	<100	<10	<5	
	9/9/1997	<10	<10	<10	<5	<100	<10	<5	
	3/19/1998	<10	<10	<10	<5	<100	<10	<5	
	9/30/1998	<10	<10	<10	<5	<100	<10	<5	
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	4/10/2000	<0.5	<0.5	<0.5	<1.0	n/a	<20	<0.5	<
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<
	9/30/2002	<5	<1	<2	<2	<5	<10	<2	
	3/4/2003	<5	<1	<2	<2	<5	<10	<2	
	10/2/2003	<1	<0.5	<0.5	<0.5	<1	<2	<0.5	<
BH-5	2/25/1992	<10	<10	<10	<5	<10	<5	<5	
	5/19/1992	<10	<10	<10	<5	<10	<5	<5	
	8/18/1992	<10	<10	<10	<5	<10	<5	<5	
	11/16/1992	<10	<10	<10	<5	<10	<5	<5	
	10/9/1993	<10	<10	<10	<5	<10	8	<5	
	3/17/1994	<10	<10	<10	<5	<10	6*	38*	
	4/17/1995	<10	<10	<10	<5	<100	<10	<5	
	9/27/1995	<10	<10	<10	<5	<100	<10	<5	
	3/4/1996	<10	<10	<10	<5	<100	<10	<5	
	9/25/1996	<10	<10	<10	<5	<100	<10	<5	
	3/10/1997	<10	<10	<10	<5	<100	<10	<5	
	9/10/1997	<10	<10	<10	<5	<100	<10	<5	
	3/19/1998	<10	<10	<10	<5	<100	<10	<5	
	9/30/1998	<10	<10	<10	<5	<100	<10	<5	
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
	11/18/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
	4/10/2000	<0.5	<0.5	<0.5	<1.0	n/a	<20	<0.5	
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
	10/24/2001	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.7	
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Assessment Monitoring - Appendix II	7/30/2002	<5	<1	<2	<2	<5	<10	<2	
	9/30/2002	<5	<1	<2	<2	<5	<10	<2	
	3/4/2003	<5	<1	<2	<2	<10	<10	<2	
	6/17/2003	<1	<0.5	<0.5	<0.5	<10	<2	<0.5	
	10/2/2003	<5	<1	<2	<2	<5	<10	<2	
	12/18/2003	<1	<0.5	<0.5	<0.5	<2	<2	<0.5	
	5/18/1992	<10	<10	<10	<5	<10	<5	<5	
	8/18/1992	<10	<10	<10	<5	<10	<5	<5	
	11/16/1992	<10	<10	<10	<5	<10	<5	<5	
	10/8/1993	<10	<10	<10	<5	<10	4	<5	

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	cis-1,2-Dichloroethene (ug/L)	trans-1,2-Dichloroethene (ug/L)	Chloroform (ug/L)	1,2-Dichloroethane (ug/L)	2-Butanone (ug/L)	1,1,1-Trichloroethane (ug/L)
BH-2	5/19/1992	<5	<5	<5	<5	<10	<5
	8/18/1992	<5	<5	<5	<5	<10	<5
	11/16/1992	<5	<5	<5	<5	<10	<5
	10/9/1993	<5	<5	<5	<5	<10	<5
	3/17/1994	<5	<5	<5	<5	<10	<5
	4/18/1995	<5	<5	<5	<5	<10	<5
	9/28/1995	<5	<5	<5	<5	<10	<5
	3/4/1996	<5	<5	<5	<5	<10	<5
	9/25/1996	<5	<5	<5	<5	<10	<5
	3/10/1997	<5	<5	<5	<5	<10	<5
	9/9/1997	<5	<5	<5	<5	<10	<5
	3/19/1998	<5	<5	<5	<5	<10	<5
	9/30/1998	<5	<5	<5	<5	<10	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	<0.5	<0.5	<0.5	<0.5	<20	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/2002	<2	<2	<2	<2	<10	<2
	3/4/2003	<2	<2	<2	<2	<10	<2
	10/2/2003	<0.5	<0.5	<0.5	<0.5	<2	<0.5
BH-5	2/25/1992	<5	<5	<5	<5	<10	<5
	5/19/1992	<5	<5	<5	<5	<10	<5
	8/18/1992	<5	<5	<5	<5	<10	<5
	11/16/1992	<5	<5	<5	<5	<10	<5
	10/9/1993	<5	<5	<5	<5	<10	<5
	3/17/1994	<5	<5	<5	<5	<10	<5
	4/17/1995	<5	<5	<5	<5	<10	<5
	9/27/1995	<5	<5	<5	<5	<10	<5
	3/4/1996	<5	<5	<5	<5	<10	<5
	9/25/1996	<5	<5	<5	<5	<10	<5
	3/10/1997	<5	<5	<5	<5	<10	<5
	9/10/1997	<5	<5	<5	<5	<10	<5
	3/19/1998	<5	<5	<5	<5	<10	<5
	9/30/1998	<5	<5	<5	<5	<10	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	11/18/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/10/2000	<0.5	<0.5	<0.5	<0.5	<20	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Assessment Monitoring - Appendix II	7/30/2002	<2	<2	<2	<2	<10	<2
	9/30/2002	<2	<2	<2	<2	<10	<2
	3/4/2003	<2	<2	<2	<2	<10	<2
	6/17/2003	<0.5	<0.5	<0.5	<0.5	<2	<0.5
	10/2/2003	<2	<2	<2	<2	<10	<2
	12/18/2003	<0.5	<0.5	<0.5	<0.5	<2	<0.5
	5/18/1992	<5	<5	<5	<5	<10	<5
	8/18/1992	<5	<5	<5	<5	<10	<5
	11/16/1992	<5	<5	<5	<5	<10	<5
	10/8/1993	<5	<5	<5	<5	<10	<5

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Bromo-diclorometliane (ug/L)	1,2-Dichloropropane (ug/L)	cis-1,3-Dichloropropene (ug/L)	TCE (ug/L)	Dibromo-chloromethane (ug/L)	1,1,2-Trichloroethane (ug/L)
	5/19/1992	<5	<5	<5	<5	<5	<5
	8/18/1992	<5	<5	<5	<5	<5	<5
	11/16/1992	<5	<5	<5	<5	<5	<5
	10/9/1993	<5	<5	<5	<5	<5	<5
	3/17/1994	<5	<5	<5	<5	<5	<5
	4/18/1995	<5	<5	<5	<5	<5	<5
	9/28/1995	<5	<5	<5	<5	<5	<5
	3/4/1996	<5	<5	<5	<5	<5	<5
	9/25/1996	<5	<5	<5	<5	<5	<5
	3/10/1997	<5	<5	<5	<5	<5	<5
	9/9/1997	<5	<5	<5	<5	<5	<5
BH-2	3/19/1998	<5	<5	<5	<5	<5	<5
	9/30/1998	<5	<5	<5	<5	<5	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/30/2002	<2	<2	<2	<2	<2	<2
	3/4/2003	<2	<2	<2	<2	<2	<2
	10/2/2003	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	2/25/1992	<5	<5	<5	<5	<5	<5
	5/19/1992	<5	<5	<5	<5	<5	<5
	8/18/1992	<5	<5	<5	<5	<5	<5
	11/16/1992	<5	<5	<5	<5	<5	<5
	10/9/1993	<5	<5	<5	<5	<5	<5
	3/17/1994	<5	<5	<5	<5	<5	<5
	4/17/1995	<5	<5	<5	<5	<5	<5
	9/27/1995	<5	<5	<5	<5	<5	<5
	3/4/1996	<5	<5	<5	<5	<5	<5
	9/25/1996	<5	<5	<5	<5	<5	<5
BH-5	3/10/1997	<5	<5	<5	<5	<5	<5
	9/10/1997	<5	<5	<5	<5	<5	<5
	3/19/1998	<5	<5	<5	<5	<5	<5
	9/30/1998	<5	<5	<5	<5	<5	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	11/18/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/10/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	7/30/2002	<2	<2	<2	<2	<2	<2
	9/30/2002	<2	<2	<2	<2	<2	<2
Assessment Monitoring - Appendix II	3/4/2003	<2	<2	<2	<2	<2	<2
	6/17/2003	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/2/2003	<2	<2	<2	<2	<2	<2
	12/18/2003	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	5/18/1992	<5	<5	<5	<5	<5	<5
	8/18/1992	<5	<5	<5	<5	<5	<5
	11/16/1992	<5	<5	<5	<5	<5	<5
	10/8/1993	<5	<5	<5	<5	<5	<5

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Bromoform (ug/L)	4-Methyl-2-Pentanone (ug/L)	2-Hexanone (ug/L)	Tetrachloroethene (ug/L)	1,1,2,2 Tetrachloroethane (ug/L)	Toluene (ug/L)	Chlorober (ug/L
BH-2	5/19/1992	<5	<10	<10	<5	<5	<5	<5
	8/18/1992	<5	<10	<10	<5	<5	<5	<5
	11/16/1992	<5	<10	<10	<5	<5	<5	<5
	10/9/1993	<5	<10	<10	<5	<5	<5	<5
	3/17/1994	<5	<10	<10	<5	<5	<5	<5
	4/18/1995	<5	<10	<10	<5	<5	<5	<5
	9/28/1995	<5	<10	<10	<5	<5	<5	<5
	3/4/1996	<5	<10	<10	<5	<5	<5	<5
	9/25/1996	<5	<10	<10	<5	<5	<5	<5
	3/10/1997	<5	<10	<10	<5	<5	<5	<5
	9/9/1997	<5	<10	<10	<5	<5	<5	<5
	3/19/1998	<5	<10	<10	<5	<5	<5	<5
	9/30/1998	<5	<10	<10	<5	<5	<5	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	0.59	<0.5
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	<0.5	<20	<20	<0.5	<0.5	<0.5	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<2	<0.5	<5	<2	<2	<2	<2
	9/30/2002	<0.5	<1	<1	1	<0.5	<0.5	<0.5
	3/4/2003	<2	<5	<5	<2	<2	<2	<2
	10/2/2003	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5
BH-5	2/25/1992	<5	<10	<10	<5	<5	<5	<5
	5/19/1992	<5	<10	<10	<5	<5	<5	<5
	8/18/1992	<5	<10	<10	<5	<5	<5	<5
	11/16/1992	<5	<10	<10	<5	<5	<5	<5
	10/9/1993	<5	<10	<10	<5	<5	<5	<5
	3/17/1994	<5	<10	<10	<5	<5	<5	<5
	4/17/1995	<5	<10	<10	<5	<5	<5	<5
	9/27/1995	<5	<10	<10	<5	<5	<5	<5
	3/4/1996	<5	<10	<10	<5	<5	<5	<5
	9/25/1996	<5	<10	<10	<5	<5	<5	<5
	3/10/1997	<5	<10	<10	<5	<5	<5	<5
	9/10/1997	<5	<10	<10	<5	<5	<5	<5
	3/19/1998	<5	<10	<10	<5	<5	<5	<5
	9/30/1998	<5	<10	<10	<5	<5	<5	<5
	3/3/1999	<0.5	<0.5	<0.5	0.69	<0.5	<0.5	<0.5
	11/18/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/10/2000	<0.5	<20	<20	0.5	<0.5	<0.5	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Assessment Monitoring - Appendix II	7/30/2002	<2	<5	<5	<2	<2	<2	<2
	9/30/2002	<2	<5	<5	<2	<2	<2	<2
	3/4/2003	<2	<5	<5	<2	<2	<2	<2
	6/17/2003	<0.5	<1	<1	1.0	<0.5	<0.5	<0.5
	10/2/2003	<2	<5	<5	<2	<2	<2	<2
	12/18/2003	<0.5	<1	<1	<0.5	<0.5	<0.5	<0.5
	5/18/1992	<5	<10	<10	<5	<5	<5	<5
	8/18/1992	<5	<10	<10	<5	<5	<5	<5
	11/16/1992	<5	<10	<10	<5	<5	<5	<5
	10/8/1993	<5	<10	<10	<5	<5	<5	<5

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Xylenes, Total (ug/L)	1,2-Dichlorobenzene (ug/L)	1,4-Dichlorobenzene (ug/L)	1,2-Dibromo-3-Chloropropane (ug/L)	1,2-Dibromoethane (ug/L)	trans-1,4-Dichloro-2-But (ug/L)
BH-2	5/19/1992	<5	<5	<5	<5	<5	<5
	8/18/1992	<5	<5	<5	<5	<5	<5
	11/16/1992	<5	<5	<5	<5	<5	<5
	10/9/1993	<5	<5	<5	<5	<5	<5
	3/17/1994	<5	<5	<5	<5	<5	<5
	4/18/1995	<5	<5	<5	<5	<5	<5
	9/28/1995	<5	<5	<5	<5	<5	<5
	3/4/1996	<5	<5	<5	<5	<5	<5
	9/25/1996	<5	<5	<5	<5	<5	<5
	3/10/1997	<5	<5	<5	<5	<5	<5
	9/9/1997	<5	<5	<5	<5	<5	<5
	3/19/1998	<5	<5	<5	<5	<5	<5
	9/30/1998	<5	<5	<5	<5	<5	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	<0.5	<0.5	<0.5	<2	<2	n/a
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<2	<2	<2	<0.5	<0.5	<0.5
	9/30/2002	<0.5	<0.5	<0.5	<0.010	<2	<2
	3/4/2003	<2	<2	<2	<0.010	<0.010	<2
	10/2/2003	<0.5	<0.5	<0.5	<0.010	<0.010	<0.5
BH-5	2/25/1992	<5	<5	<5	<5	<5	<5
	5/19/1992	<5	<5	<5	<5	<5	<5
	8/18/1992	<5	<5	<5	<5	<5	<5
	11/16/1992	<5	<5	<5	<5	<5	<5
	10/9/1993	<5	<5	<5	<5	<5	<5
	3/17/1994	<5	<5	<5	<5	<5	<5
	4/17/1995	<5	<5	<5	<5	<5	<5
	9/27/1995	<5	<5	<5	<5	<5	<5
	3/4/1996	<5	<5	<5	<5	<5	<5
	9/25/1996	<5	<5	<5	<5	<5	<5
	3/10/1997	<5	<5	<5	<5	<5	<5
	9/10/1997	<5	<5	<5	<5	<5	<5
	3/19/1998	<5	<5	<5	<5	<5	<5
	9/30/1998	<5	<5	<5	<5	<5	<5
	3/3/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	11/18/1999	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/10/2000	<0.5	<0.5	<0.5	<2	<2	n/a
	9/25/2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Assessment Monitoring - Appendix II	7/30/2002	<2	<2	<2	<0.010	<0.010	<2
	9/30/2002	<2	<2	<2	<0.010	<0.010	<2
	3/4/2003	<2	<2	<2	<2	<2	<2
	6/17/2003	<0.5	<0.5	<0.5	<0.010	<0.010	<0.5
	10/2/2003	<2	<2	<2	<0.010	<0.010	<2
	12/18/2003	<0.5	<0.5	<0.5	<0.010	<0.010	<0.5
	5/18/1992	<5	<5	<5	<5	<5	<5
	8/18/1992	<5	<5	<5	<5	<5	<5
	11/16/1992	<5	<5	<5	<5	<5	<5
	10/8/1993	<5	<5	<5	<5	<5	<5

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	1,1,1,2-Tetrachloroethane (ug/L)	Trichloro fluromethane (ug/L)	Dichloro-difluoromethane (ug/L)	Bromo-chloromethane (ug/L)
BH-2	5/19/1992	<5	<5	n/a	n/a
	8/18/1992	<5	<5	n/a	n/a
	11/16/1992	<5	<5	n/a	n/a
	10/9/1993	<5	<5	n/a	n/a
	3/17/1994	<5	<5	n/a	n/a
	4/18/1995	<5	<5	n/a	n/a
	9/28/1995	<5	<5	n/a	n/a
	3/4/1996	<5	<5	n/a	n/a
	9/25/1996	<5	<5	n/a	n/a
	3/10/1997	<5	<5	n/a	n/a
	9/9/1997	<5	<5	n/a	n/a
	3/19/1998	<5	<5	n/a	n/a
	9/30/1998	<5	<5	n/a	n/a
	3/3/1999	<0.5	<0.5	<0.5	<0.5
	11/18/1999	n/a	n/a	n/a	n/a
	4/10/2000	<0.5	<0.5	<0.5	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5
	9/30/2002	<2	<2	<2	<2
	3/4/2003	<2	<2	<2	<2
	10/2/2003	<0.5	<0.5	<0.5	<0.5
BH-5	2/25/1992	<5	<5	n/a	n/a
	5/19/1992	<5	<5	n/a	n/a
	8/18/1992	<5	<5	n/a	n/a
	11/16/1992	<5	<5	n/a	n/a
	10/9/1993	<5	<5	n/a	n/a
	3/17/1994	<5	<5	n/a	n/a
	4/17/1995	<5	<5	n/a	n/a
	9/27/1995	<5	<5	n/a	n/a
	3/4/1996	<5	<5	n/a	n/a
	9/25/1996	<5	<5	n/a	n/a
	3/10/1997	<5	<5	n/a	n/a
	9/10/1997	<5	<5	n/a	n/a
	3/19/1998	<5	<5	n/a	n/a
	9/30/1998	<5	<5	n/a	n/a
	3/3/1999	n/a	<0.5	0.67	<0.5
	11/18/1999	n/a	<0.5	0.78	<0.5
	4/10/2000	<0.5	<0.5	<0.5	<0.5
	9/25/2000	<0.5	<0.5	<0.5	<0.5
	4/17/2001	<0.5	<0.5	<0.5	<0.5
	10/24/2001	<0.5	<0.5	<0.5	<0.5
	4/24/2002	<0.5	<0.5	<0.5	<0.5
Assessment Monitoring - Appendix II	7/30/2002	<2	<2	<2	<2
	9/30/2002	<2	<2	<2	<2
	3/4/2003	<2	<2	<2	<2
	6/17/2003	n/a	<0.5	<0.5	<0.5
	10/2/2003	<2	<2	<2	<2
	12/18/2003	n/a	<0.5	<0.5	<0.5
	5/18/1992	<5	<5	n/a	n/a
	8/18/1992	<5	<5	n/a	n/a
	11/16/1992	<5	<5	n/a	n/a
	10/8/1993	<5	<5	n/a	n/a

TABLE 4

Volatile Organic Results Summary - Iron County Landfill

March 1992 - December 2003

		Assessment Monitoring Parameters						
Well ID	**Date Sampled**	**Acetonitrile (ug/L)**	**Acrolein (ug/L)**	**Allyl Chloride (ug/L)**	**Chloroprene (ug/L)**	**1,3-Dichloropropane (ug/L)**	**2,2-Dichloropropane (ug/L)**	**1,1-Dichloro-1-Propene (ug/L)**
	5/19/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	10/9/1993	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/17/1994	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/18/1995	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/28/1995	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/4/1996	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/1996	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/10/1997	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/9/1997	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BH-2	3/19/1998	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/30/1998	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/3/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	10/24/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/24/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/30/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/4/2003	<5	<5	<2	<2	<2	<2	<2
	10/2/2003	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2/25/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5/19/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	10/9/1993	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/17/1994	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/1995	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/27/1995	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/4/1996	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/1996	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BH-5	3/10/1997	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/10/1997	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/19/1998	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/30/1998	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	3/3/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/2000	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	10/24/2001	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/24/2002	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/30/2002	<5	<5	<2	<2	<2	<2	<2
	9/30/2002	<5	<5	<2	<2	<2	<2	<2
Assessment Monitoring - Appendix II	3/4/2003	<5	<5	<2	<2	<2	<2	<2
	6/17/2003	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5
	10/2/2003	<5	<5	<2	<2	<2	<2	<2
	12/18/2003	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5
	5/18/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/1992	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	10/8/1993	n/a	n/a	n/a	n/a	n/a	n/a	n/a

TABLE 4
Volatile Organic Results Summary - Iron County Landfill
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Well ID	Date Sampled	Assessment Monitoring Parameters					
		Methacrylonitrile (ug/L)	Chloromethane (ug/L)	Iodomethane (ug/L)	Methyl - methacrylate (ug/L)	Dibromo- methane (ug/L)	Naphthale (ug/L)
BH-2	5/19/1992	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/1992	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/1992	n/a	n/a	n/a	n/a	n/a	n/a
	10/9/1993	n/a	n/a	n/a	n/a	n/a	n/a
	3/17/1994	n/a	n/a	n/a	n/a	n/a	n/a
	4/18/1995	n/a	n/a	n/a	n/a	n/a	n/a
	9/28/1995	n/a	n/a	n/a	n/a	n/a	n/a
	3/4/1996	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/1996	n/a	n/a	n/a	n/a	n/a	n/a
	3/10/1997	n/a	n/a	n/a	n/a	n/a	n/a
	9/9/1997	n/a	n/a	n/a	n/a	n/a	n/a
	3/19/1998	n/a	n/a	n/a	n/a	n/a	n/a
	9/30/1998	n/a	n/a	n/a	n/a	n/a	n/a
	3/3/1999	n/a	n/a	n/a	n/a	n/a	n/a
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/2000	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/2001	n/a	n/a	n/a	n/a	n/a	n/a
	10/24/2001	n/a	n/a	n/a	n/a	n/a	n/a
	4/24/2002	n/a	n/a	<5	n/a	n/a	n/a
	9/30/2002	n/a	n/a	<1	n/a	n/a	n/a
	3/4/2003	<5	<5	<5	n/a	n/a	n/a
	10/2/2003	n/a	<5	<1	n/a	n/a	n/a
BH-5	2/25/1992	n/a	n/a	n/a	n/a	n/a	n/a
	5/19/1992	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/1992	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/1992	n/a	n/a	n/a	n/a	n/a	n/a
	10/9/1993	n/a	n/a	n/a	n/a	n/a	n/a
	3/17/1994	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/1995	n/a	n/a	n/a	n/a	n/a	n/a
	9/27/1995	n/a	n/a	n/a	n/a	n/a	n/a
	3/4/1996	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/1996	n/a	n/a	n/a	n/a	n/a	n/a
	3/10/1997	n/a	n/a	n/a	n/a	n/a	n/a
	9/10/1997	n/a	n/a	n/a	n/a	n/a	n/a
	3/19/1998	n/a	n/a	n/a	n/a	n/a	n/a
	9/30/1998	n/a	n/a	n/a	n/a	n/a	n/a
	3/3/1999	n/a	n/a	n/a	n/a	n/a	n/a
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/2000	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/2001	n/a	n/a	n/a	n/a	n/a	n/a
	10/24/2001	n/a	n/a	n/a	n/a	n/a	n/a
	4/24/2002	n/a	n/a	n/a	n/a	n/a	n/a
Assessment Monitoring - Appendix II	7/30/2002	<5	<5	<5	<5	<2	<2
	9/30/2002	<5	<5	<5	<5	<2	<2
	3/4/2003	<5	<5	<5	<5	<2	<2
	6/17/2003	<1	<1	<0.5	<1	<0.5	<0.5
	10/2/2003	<5	<3	<5	<5	<2	<2
	12/18/2003	<1	<1	<1	<1	<0.5	<0.5
	5/18/1992	n/a	n/a	n/a	n/a	n/a	n/a
	8/18/1992	n/a	n/a	n/a	n/a	n/a	n/a
	11/16/1992	n/a	n/a	n/a	n/a	n/a	n/a
	10/8/1993	n/a	n/a	n/a	n/a	n/a	n/a

TABLE 5
Metals Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Antimony (ug/L)	Arsenic (ug/L)	Barium (ug/L)	Beryllium (ug/L)	Cadmium (ug/L)	Chromium (ug/L)	Cobalt (ug/L)	Copper (ug/L)
BH-2	3/29/1992	12	9	520	<5	<5	<10	<20	40
	4/29/1992	11	6	630	<5	<5	<10	<20	<10
	5/19/1992	13	13	220	<5	<5	<10	<20	40
	8/18/1992	2	2	510	<5	n/a	10	<20	30
	11/16/1992	4	<11	340	<5	n/a	<10	<20	40
	3/22/1993	4	6	160	<5	n/a	<10	<20	70
	10/9/1993	4	1	750	<5	<5	<10	<20	80
	3/17/1994	8	59*	560	<5	<5	30	<20	80
	4/18/1995	n/a	n/a	134	<2	<3(J)	<10(J)	<1	<10(J)
	9/28/1995	n/a	n/a	106	<2	<.6	<10	<1	<10
	3/4/1996	n/a	n/a	214	<2	<.5	<10(J)	<1	<10
	9/25/1996	<2(J)	17	718	<2	<3	<10(J)	<10	<10(J)
	3/10/1997	<2(J)	18	119	<2	<3(J)	<10(J)	<10	<10(J)
	9/9/1997	<2(J)	15	167	<2	<3	<10(J)	<10	50
	3/18/1998	<2(J)	15	251	<2	<3	<10	<10	<10(J)
	9/30/1998	4	16	254	<2	<3	<10	<10	30
	3/3/1999	3	12	43	<2	<3	<10	<10	<10
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	2	9	58	<2	<3	<10	<10	6
	9/25/2000	2.5	8	38	<1	<3	<10	<10	2
	4/17/2001	2	15.6	33.6	<0.5	<3	<10	<10	1.8
	10/24/2001	2.3	11	40.1	<0.5	<3	<10	<10	<1
	4/24/2002	2.9	14.2	32	<2	<3	<10	<10	<10
	9/30/2002	<5	12	33	<1	<4	<10	<10	6.4
	3/4/2003	<5	13	32	<1	<4	<100	<10	<4
	10/2/2003	<5	13	32	<1	<4	<100	<10	<4
BH-2 Prediction Limits		*Cusum***	*Cusum***	*Cusum***	*1*	*5*	*30*	*60*	*Cusum***
BH-5	2/25/1992	<1	7	140	<5	<5	60	10	20
	3/29/1992	<1	2	70	<5	<5	<10	<20	<10
	4/29/1992	1	3	n/a	<5	<5	10	<20	<10
	5/19/1992	<1	4	140	<5	<5	90	<20	20
	8/19/1992	<1	8	180	<5	n/a	100	<20	20
	11/16/1992	1	<11	90	<5	n/a	30	<20	10
	3/19/1993	<1	2	130	<5	<5	40	<20	20
	10/9/1993	2	9	520	<5	<5	70	20	90
	3/17/1994	<1	7	490	<5	<5	30	<20	50
	4/17/1995	n/a	n/a	166	<2	<.6	60	<1(J)	<10(J)
	9/27/1995	n/a	n/a	107	<2	<.6	<10(J)	<1	<10
	3/4/1996	n/a	n/a	102	<2	<.5	<10(J)	<1	<10
	9/25/1996	<2	<1(J)	115	<2	<3	<10(J)	<10	<10(J)
	3/11/1997	<2	<1(J)	155	<2	<3	<10(J)	<10(J)	<10(J)
	9/10/1997	<2	<1(J)	146	<2	<3	<10(J)	<10	60
	3/18/1998	<2	<1(J)	115	<2	<3	<10	<10	<10(J)
	9/30/1998	<2	3	126	<2	<3	10	<10	10
	3/3/1999	<2	2	129	<2	<3	<10	<10	<10
	11/18/1999	<2	<1	116	<2	<3	<10	<10	<10
	4/10/2000	<1	3	63	<1	<3	<10	<10	2
	9/25/2000	<1	2	149	<1	<3	<10	<10	<6
	4/17/2001	<0.5	1.2	118	<0.5	<3	<10	<10	<1
	10/24/2001	<0.5	1.2	143	<0.5	<3	<10	<10	<1
	4/24/2002	<0.5	1.1	150	< 2	<3	<10	<10	<10
Assessment Monitoring	7/30/2002	<5	<5	140	<1	<4	<10	<10	7.5
	9/30/2002	<5	<5	150	<1	<4	<10	<10	5.5
	3/4/2003	<5	<5	140	<1	<4	<100	<10	<4
	6/17/2003	<5	<5	140	<1	<4	<100	<10	7
	10/2/2003	<5	<5	130	<1	<4	<100	<10	<4
	12/18/2003	<5	<5	130	<1	<4	<100	<10	<4
BH-5 Prediction Limits		*2*	*Cusum***	*Cusum***	*1*	*5*	*Cusum***	*60*	*Cusum***
	3/29/1992	<1	9	60	<5	<5	<10	<20	<10
	4/29/1992	1	9	120	<5	<5	20	<20	<10
	5/18/1992	<1	5	80	<5	<5	<10	<20	<10
	8/18/1992	<1	18	110	<5	n/a	10	<20	20
	11/17/1992	<1	9	70	<5	n/a	<10	<20	<10
	3/20/1993	<1	9	50	<5	<5	30	<20	30
	10/8/1993	<1	11	50	<5	<5	20	<20	<10
	3/18/1994	<5	182*	1800*	<20	<20	520*	100*	660*
	4/18/1995	n/a	n/a	40	<2	<.6	<10(J)	<1	<10

TABLE 5
Metals Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Manganese (ug/L)	Mercury (ug/L)	Nickel (ug/L)	Selenium (ug/L)	Silver (ug/L)	Thallium (ug/L)	Tin (ug/L)
BH-2	3/29/1992	n/a	n/a	<20	7	<10	<1	n/a
	4/29/1992	n/a	n/a	<20	2	<10	<2	n/a
	5/19/1992	n/a	n/a	<20	10	<10	3	n/a
	8/18/1992	n/a	n/a	<20	13	10	<2	n/a
	11/16/1992	n/a	n/a	<20	7	<10	<2	n/a
	3/22/1993	n/a	n/a	<20	10	<10	<4	n/a
	10/9/1993	n/a	n/a	<20	<1	<10	<2	n/a
	3/17/1994	n/a	n/a	<20	6	<10	3	n/a
	4/18/1995	n/a	n/a	<10(J)	9	<5	<200	n/a
	9/28/1995	n/a	n/a	<10	10	<5	<200	n/a
	3/4/1996	n/a	n/a	<10	7	<5	<200	n/a
	9/25/1996	<10	<.2	<10	<1(J)	<6	<2(J)	n/a
	3/10/1997	<5	<.2	<10	8	<6	<2(J)	n/a
	9/9/1997	<10(J)	<.2	<10	7	<5	<2(J)	n/a
	3/18/1998	<5	<.2	<10	<1(J)	<6	<2(J)	n/a
	9/30/1998	<5	<.2	<10	9	<6	3	n/a
	3/3/1999	<5	<.2	<10	n/a	<6	3	n/a
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	<1	<10	6	<6	2.4	n/a
	9/25/2000	n/a	<1	10	5	<6	2.6	n/a
	4/17/2001	n/a	<0.5	<10	7	<5	1.85	n/a
	10/24/2001	n/a	<0.5	10	12	<5	1.6	n/a
	4/24/2002	<5	<0.2	3.2	7	<0.5	2.2	n/a
	9/30/2002	<5	<0.2	<5	<5	<10	<2	n/a
	3/4/2003	<5	<0.2	<5	<5	<10	2.3	n/a
	10/2/2003	<5	<0.2	<5	<5	<10	<2	n/a
BH-2 Prediction Limits		*n/e*	*1*	*60*	*Cusum***	*30*	*3*	
BH-5	2/25/1992	n/a	n/a	40	<1	<10	<20	n/a
	3/29/1992	n/a	n/a	<20	<1	<10	<1	n/a
	4/29/1992	n/a	n/a	<20	<1	<10	4	n/a
	5/19/1992	n/a	n/a	50	<1	<10	<1	n/a
	8/19/1992	n/a	n/a	50	4	<10	<2	n/a
	11/16/1992	n/a	n/a	<20	<1	<10	<2	n/a
	3/19/1993	n/a	n/a	<20	<1	<10	<2	n/a
	10/9/1993	n/a	n/a	50	1	<10	<2	n/a
	3/17/1994	n/a	n/a	20	<1	<10	<2	n/a
	4/17/1995	n/a	n/a	<10(J)	<1(J)	<5	<200	n/a
	9/27/1995	n/a	n/a	<10	<1(J)	<5	<200	n/a
	3/4/1996	n/a	n/a	<10(J)	<1(J)	<5	<200	n/a
	9/25/1996	89	<.2	<10(J)	<1(J)	<6	<2	n/a
	3/11/1997	107	<.2	<10(J)	5	<6	<2	n/a
	9/10/1997	68	<.2	<10(J)	6	<5	<2	n/a
	3/18/1998	148	<.2	<10	6	<6	<2	n/a
	9/30/1998	96	<.2	<10	7	<6	<2	n/a
	3/3/1999	163	<.2	<10	n/a	<6	<2	n/a
	11/18/1999	n/a	<.2	<10	<1	<6	<10	n/a
	4/10/2000	n/a	<1	<10	<1	<6	<0.5	n/a
	9/25/2000	n/a	<1	<10	<1	<6	<0.6	n/a
	4/17/2001	n/a	<0.5	<10	<1	<5	<0.5	n/a
	10/24/2001	n/a	<0.5	<10	<1	<5	<0.5	n/a
	4/24/2002	561	<0.2	2.5	<1	<0.5	<0.5	n/a
Assessment Monitoring	7/30/2002	380	<0.2	<5	<5	<10	<1	<500
	9/30/2002	230	<0.2	<5	<5	<10	<2	<500
	3/4/2003	280	<0.2	<5	<5	<10	<2	<500
	6/17/2003	180	<0.2	<5	<5	<10	<2	<500
	10/2/2003	240	<0.2	<5	<5	<10	<2	<500
	12/18/2003	180	<0.2	<5	<5	<10	<2	<500
BH-5 Prediction Limits		*n/e*	*1*	*50*	*4*	*30*	*4*	
	3/29/1992	n/a	n/a	<20	18	<10	<1	n/a
	4/29/1992	n/a	n/a	<20	8	<10	<2	n/a
	5/18/1992	n/a	n/a	<20	9	<10	2	n/a
	8/18/1992	n/a	n/a	<20	16	<10	<2	n/a
	11/17/1992	n/a	n/a	<20	10	<10	<2	n/a
	3/20/1993	n/a	n/a	30	9	<10	<2	n/a
	10/8/1993	n/a	n/a	<20	11	<10	<2	n/a
	3/18/1994	n/a	n/a	2	<5	<50	<10	n/a
	4/18/1995	n/a	n/a	<10	18	<5	<200	n/a
	9/27/1995	n/a	n/a	50	20	<5	<200	n/a

TABLE 6
Miscellaneous Inorganic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Ammonia (ug/L)	Bicarbonate (mg/L)	Calcium (mg/L)	Carbonate (mg/L)	Chloride (mg/L)	Magnesium (mg/L)
BH-2	3/29/1992	n/a*	<2.0	140	40	64	4
	4/29/1992	n/a	38	250	44	81	8
	5/19/1992	n/a	90	169	<2.0	66	38
	8/18/1992	n/a	114	198	40	86	29
	11/16/1992	n/a	52	95	<2.0	64	101
	3/22/1993	n/a	48	170	24	60	2
	10/9/1993	n/a	n/a	239	96	83	1
	3/17/1994	n/a	140	184	<2.0	73	95
	4/18/1995	n/a	144	108	<2.0	44	84.7
	9/28/1995	n/a	146	161	<2.0	46	92.3
	3/4/1996	n/a	111	128	<2.0	61	89.1
	9/25/1996	<50	155	114	<2.0	63	66.7
	3/10/1997	<50(J)	156	125	<2.0	55	74
	9/9/1997	<50	127	121	<2.0	64	84
	3/18/1998	<50(J)	128	90	<2.0	56	66.9
	9/30/1998	320	117	131	<2.0	39	82.7
	3/3/1999	n/a	151	145	<2.0	47	74.3
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/2000	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/2001	n/a	n/a	n/a	n/a	n/a	n/a
	10/24/2001	n/a	n/a	n/a	n/a	n/a	n/a
	4/24/2002	< 50	148	150	<2.0	56	66.2
	9/30/2002	60	130	140	<10	64	56
	3/4/2003	100	160	130	<10	88	61
	10/2/2003	90	200	140	<10	62	65
BH-2 Prediction Limits		*n/e*	*n/e*	*n/e*	*n/e*	*n/e*	*n/e*
BH-5	2/25/1992	n/a	142	82	<2.0	160	24
	3/29/1992	n/a	122	69	<2.0	170	21
	4/29/1992	n/a	152	88	8	170	28
	5/19/1992	n/a	182	101	<2.0	157	35
	8/19/1992	n/a	168	105	8	150	39
	11/16/1992	n/a	198	96	<2.0	171	32
	3/19/1993	n/a	156	92	<2.0	136	33
	10/9/1993	n/a	200	98	<2.0	130	34
	3/17/1994	n/a	166	93	<2.0	136	34
	4/17/1995	n/a	150	94.2	<2.0	150	35.3
	9/27/1995	n/a	158	100	<2.0	125	37.4
	3/4/1996	n/a	163	101	<2.0	150	35.7
	9/25/1996	<50	164	105	<2.0	132	39.3
	3/11/1997	<50(J)	197	105	<2.0	150	38.3
	9/10/1997	<50(J)	236	119	<2.0	148	42.9
	3/18/1998	<50(J)	267	114	<2.0	150	43.9
	9/30/1998	220	310	136	<2.0	154	45.1
	3/3/1999	n/a	318	124	<2.0	140	44.2
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a
	4/10/2000	n/a	n/a	n/a	n/a	n/a	n/a
	9/25/2000	n/a	n/a	n/a	n/a	n/a	n/a
	4/17/2001	n/a	n/a	n/a	n/a	n/a	n/a
	10/24/2001	n/a	n/a	n/a	n/a	n/a	n/a
	4/24/2002	< 50	293	134	< 2.0	135	48.1
Assessment Monitoring	7/30/2002	<50	350	130	<10	120	46
	9/30/2002	<50	360	140	<10	110	49
	3/4/2003	200	360	140	<10	150	48
	6/17/2003	<50	330	140	<10	130	49
	10/2/2003	80	360	130	<10	150	46
	12/18/2003	260	340	120	<10	140	46
BH-5 Prediction Limits		*n/e*	*n/e*	*n/e*	*n/e*	*n/e*	*n/e*
	3/29/1992	n/a	116	65	<2.0	98	32
	4/29/1992	n/a	152	88	8	99	35
	5/18/1992	n/a	170	76	<2.0	95	36
	8/18/1992	n/a	214	94	4	94	36
	11/17/1992	n/a	162	84	<2.0	99	41
	3/20/1993	n/a	158	75	<2.0	97	38
	10/8/1993	n/a	192	76	<2.0	95	38
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 6
Miscellaneous Inorganic Results Summary - Iron County Landfill
March 1992 - December 2003

Well ID	Date Sampled	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	pH (SIU)	COD (mg/L)	TOC (mg/L)	Cya
BH-2	3/29/1992	10	29	251	n/a	n/a	n/a	
	4/29/1992	12	37	523	n/a	n/a	n/a	
	5/19/1992	13	40	467	n/a	n/a	n/a	
	8/18/1992	7	36	416	n/a	n/a	n/a	
	11/16/1992	8	46	549	n/a	n/a	n/a	
	3/22/1993	14	40	418	n/a	n/a	n/a	
	10/9/1993	9	41	451	n/a	n/a	n/a	
	3/17/1994	5	42	726	n/a	n/a	n/a	
	4/18/1995	5	39	520	n/a	n/a	n/a	
	9/28/1995	5	40.1	643	n/a	n/a	n/a	
	3/4/1996	5.3	41.2	530	n/a	n/a	n/a	
	9/25/1996	6.3	42	460	7.6	n/a	n/a	
	3/10/1997	5.2	39.3	440	7.9	n/a	n/a	
	9/9/1997	5.3	39.9	440	8	n/a	n/a	
	3/18/1998	6.1	40.3	470	7.9	n/a	n/a	
	9/30/1998	5.3	41.4	560	7.8	n/a	n/a	
	3/3/1999	5.3	36.2	550	7.9	n/a	6	
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	
	4/10/2000	n/a	n/a	n/a	7.5	n/a	2	
	9/25/2000	n/a	n/a	n/a	7.6	n/a	3	
	4/17/2001	n/a	n/a	n/a	7.6	n/a	4	
	10/24/2001	n/a	n/a	n/a	7.5	n/a	2	
	4/24/2002	4.5	36.7	450	7.2	< 50	1	
	9/30/2002	5	34	320	7.8	n/a	<1	
	3/4/2003	5	37	480	7.4	<10	<1	
	10/2/2003	4.2	36	310	7.4	<10	<1	
BH-2 Prediction Limits		*n/e*	*n/e*	*n/e*	*n/e*	*n/e*	*n/e*	
BH-5	2/25/1992	23	44	49	n/a	n/a	n/a	
	3/29/1992	22	44	58	n/a	n/a	n/a	
	4/29/1992	25	54	91	n/a	n/a	n/a	
	5/19/1992	13	37	117	n/a	n/a	n/a	
	8/19/1992	11	47	158	n/a	n/a	n/a	
	11/16/1992	25	50	45	n/a	n/a	n/a	
	3/19/1993	8	34	99	n/a	n/a	n/a	
	10/9/1993	8	31	101	n/a	n/a	n/a	
	3/17/1994	5	30	86	n/a	n/a	n/a	
	4/17/1995	3.4	31.7	90	n/a	n/a	n/a	
	9/27/1995	4.1	32.2	110	n/a	n/a	n/a	
	3/4/1996	5.1	33.8	100	n/a	n/a	n/a	
	9/25/1996	4.3	37	110	7.4	n/a	n/a	
	3/11/1997	3.7	34.6	100	7.6	n/a	n/a	
	9/10/1997	3.9	39.9	80	7.7	n/a	n/a	
	3/18/1998	5.3	40.5	100	7.4	n/a	n/a	
	9/30/1998	3.7	41.2	90	7.4	n/a	n/a	
	3/3/1999	5.7	38.7	70	7.3	n/a	4	
	11/18/1999	n/a	n/a	n/a	n/a	n/a	n/a	
	4/10/2000	n/a	n/a	n/a	7.4	n/a	3	
	9/25/2000	n/a	n/a	n/a	7.5	n/a	3	
	4/17/2001	n/a	n/a	n/a	7.4	n/a	12	
	10/24/2001	n/a	n/a	n/a	7.1	n/a	1	
	4/24/2002	9.2	42.8	60	7.2	10	4	
Assessment Monitoring	7/30/2002	7.5	42	60	7.1	<10	1.1	
	9/30/2002	6.1	40	55	7.4	<10	<1.0	
	3/4/2003	7.7	43	78	7.2	10	<1	
	6/17/2003	5.7	40	100	6.9	<10	<1	
	10/2/2003	5.8	39	98	7.1	<10	<1	
	12/18/2003	6.0	41	80	7.2	<10	1.9	
BH-5 Prediction Limits		*n/e*	*n/e*	*n/e*	*n/e*	*n/e*	*n/e*	
	3/29/1992	2	23	101	n/a	n/a	n/a	
	4/29/1992	5	25	121	n/a	n/a	n/a	
	5/18/1992	4	26	111	n/a	n/a	n/a	
	8/18/1992	3	25	78	n/a	n/a	n/a	
	11/17/1992	2	30	132	n/a	n/a	n/a	
	3/20/1993	2	28	101	n/a	n/a	n/a	
	10/8/1993	2	27	84	n/a	n/a	n/a	
	3/18/1994	[illegible]	22	84	n/a	n/a	n/a	

TABLE 7
Pesticides and Herbicides Results Summary - Iron
July 2002 - Decem

		Pesticides by EPA 8081A/3											
Well ID	**Date Sampled**	**4,4'-DDD (ug/L)**	**4,4'-DDE (ug/L)**	**4,4'-DDT (ug/L)**	**Aldrin (ug/L)**	**alpha-BHC (ug/L)**	**beta-BHC (ug/L)**	**Chlordane (ug/L)**	**delta-BHC (ug/L)**	**Dieldrin (ug/L)**	**Endosulfan I (ug/L)**	**Endosulfan II (ug/L)**	**En sulfa**
BH-5	**7/30/2002**	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	
	9/30/2002	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	
	3/4/2003	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	
	6/17/2003	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	
	10/2/2003	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	
	12/18/2003	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.25	<0.10	<0.10	<0.10	<0.10	
Reporting Limit (PQL)		*0.10*	*0.10*	*0.10*	*0.10*	*0.10*	*0.10*	*0.25*	*0.10*	*0.10*	*0.10*	*0.10*	

*Data exceeding the prediction limit shown in red

TABLE

Semivolatile Organic Results Summary - Iron C

July 2002 - Decem

Well ID	Date Sampled	Acenaphthene (ug/L)	Acenaphthylene (ug/L)	Acetophenone (ug/L)	2-Acetylamino fluorene (ug/L)	4-Amino biphenyl (ug/L)	Anthracene (ug/L)	Benz(a) anthracene (ug/L)	Benzo(fluoranthene
BH-5	7/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	9/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	3/4/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	6/17/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	10/2/2003	<10	<10	<10	<10	<10	<10	<10	<20
	12/18/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
Prac.Quant.Limits (PQL)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

Well ID	Date Sampled	4-Bromophenyl phenylether (ug/L)	Butyl benzyl phthalate (ug/L)	4-Chloroaniline (ug/L)	Chlorobenzilate (ug/L)	4-Chloro-3-methylphenol (ug/L)	2-Chloro naphthalene (ug/L)	2-Chloro phenol (ug/L)	4-Chlorophen ether (ug
BH-5	7/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	9/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	3/4/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	6/17/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	10/2/2003	<10	<10	<10	<10	<10	<10	<10	<10
	12/18/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Prac.Quant.Limits (PQL)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

Well ID	Date Sampled	2,4-Dichlor phenol (ug/L)	2,6-Dichlorpheno (ug/L)	Diethyl phthalate (ug/L)	Thionazin (ug/L)	Dimethoate (ug/L)	p-Dimethyl aminoazo benzene (ug/L)	7,12-Dimethyl benz(a) anthracene (ug/L)	3,3'-Dime benzide (ug/L)
BH-5	7/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	9/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	3/4/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	6/17/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
	10/2/2003	<10	<10	<10	<10	<10	<10	<10	<20
	12/18/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<10
Prac.Quant.Limits (PQL)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

Well ID	Date Sampled	Di-n-octyl phthalate (ug/L)	Diphenylamine (ug/L)	Disulfoton (ug/L)	Ethyl methanesulfonate (ug/L)	Famphur (ug/L)	Fluoranthene (ug/L)	Fluorene (ug/L)	Hexachl benzen (ug/L)
BH-5	7/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	9/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	3/4/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	6/17/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<1
	10/2/2003	<10	<10	<10	<10	<10	<10	<10	<2.0
	12/18/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	<1
Prac.Quant.Limits (PQL)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

n/a = not sampled or not analyzed
n/e = GWPS not established
All analyses by EPA 8270C/3510C

TABLE 8

Semivolatile Organic Results Summary - Iron C

July 2002 - Decem

Well ID	Date Sampled	Methapyrilene (ug/L)	Methyl chloanthrene (ug/L)	Methyl methane sulfonate (ug/L)	2-Methyl naphthalene (ug/L)	Methyl parathion (ug/L)	1,4-Naphtho-quinone (ug/L)	1-Naphthylamine (ug/L)	2-Naphthyl (ug/L)
BH-5	7/30/2002	< 5.0	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	9/30/2002	< 5.0	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	3/4/2003	< 5.0	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	6/17/2003	< 5.0	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	10/2/2003	<10	<20	<10	<10	<10	<10	<10	<10
	12/18/2003	< 5.0	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Prac.Quant.Limits (PQL)		5.0	10.0	5.0	5.0	5.0	5.0	5.0	5.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

Well ID	Date Sampled	N-Nitrosodi methylamine (ug/L)	N-Nitrosodi phenylamine (ug/L)	N-Nitrosodi-n-propylamine (ug/L)	N-Nitrosomethyl ethylamine (ug/L)	N-Nitrosopi peridine (ug/L)	N-Nitroso pyrrolidine (ug/L)	5-Nitro-o-toluidine (ug/L)	Parathi (ug/L)
BH-5	7/30/2002	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	9/30/2002	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	3/4/2003	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	6/17/2003	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	10/2/2003	<20	<10	<10	<10	<10	<10	<10	<10
	12/18/2003	<10	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Prac.Quant.Limits (PQL)		10.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

Well ID	Date Sampled	Pyrene (ug/L)	Safrole (ug/L)	1,2,4,5-Tetrachloro benzene (ug/L)	2,3,4,6-Tetrachloro phenol (ug/L)	o-Toluidine (ug/L)	2,4,5-Trichloro phenol (ug/L)	2,4,6-Trichloro phenol (ug/L)	O,O,O-Tri phospho thioate
BH-5	7/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	9/30/2002	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	3/4/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	6/17/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	10/2/2003	<10	<10	<10	<10	<10	<10	<10	<10
	12/18/2003	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Prac.Quant.Limits (PQL)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
GW Prot. Standards		n/e	n/e	n/e	n/e	n/e	n/e	n/e	n/e

n/a = not sampled or not analyzed

n/e = GWPS not established

All analyses by EPA 8270C/3510C

APPENDIX G

HELP Modeling

FRACTION OF AREA ALLOWING RUNOFF = 100.0 PERCENT
AREA PROJECTED ON HORIZONTAL PLANE = 1.000 ACRES
EVAPORATIVE ZONE DEPTH = 18.0 INCHES
INITIAL WATER IN EVAPORATIVE ZONE = 1.800 INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE = 7.866 INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE = 0.432 INCHES
INITIAL SNOW WATER = 0.000 INCHES
INITIAL WATER IN LAYER MATERIALS = 26.280 INCHES
TOTAL INITIAL WATER = 26.280 INCHES
TOTAL SUBSURFACE INFLOW = 0.00 INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
CEDAR CITY UTAH

STATION LATITUDE = 37.50 DEGREES
MAXIMUM LEAF AREA INDEX = 0.00
START OF GROWING SEASON (JULIAN DATE) = 125
END OF GROWING SEASON (JULIAN DATE) = 284
EVAPORATIVE ZONE DEPTH = 18.0 INCHES
AVERAGE ANNUAL WIND SPEED = 8.80 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY = 64.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY = 36.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 34.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 58.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CEDAR CITY UTAH

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.69	0.89	1.36	1.10	0.84	0.43
1.09	1.47	0.98	0.95	1.00	0.70

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CEDAR CITY UTAH

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
29.50	34.60	40.10	47.50	56.50	66.70
74.10	72.00	63.00	51.70	39.70	30.70

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CEDAR CITY UTAH
AND STATION LATITUDE = 37.50 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	5.46	19819.801	100.00
RUNOFF	0.003	11.477	0.06
EVAPOTRANSPIRATION	4.681	16991.443	85.73
PERC./LEAKAGE THROUGH LAYER 2	0.018410	66.827	0.34
CHANGE IN WATER STORAGE	0.758	2750.049	13.88
SOIL WATER AT START OF YEAR	26.280	95396.281	
SOIL WATER AT END OF YEAR	27.038	98146.336	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.003	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.64	34993.203	100.00
RUNOFF	0.002	7.370	0.02
EVAPOTRANSPIRATION	7.306	26519.596	75.78
PERC./LEAKAGE THROUGH LAYER 2	0.024777	89.939	0.26
CHANGE IN WATER STORAGE	2.308	8376.297	23.94
SOIL WATER AT START OF YEAR	27.038	98146.336	
SOIL WATER AT END OF YEAR	29.345	106522.633	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.31	55575.293	100.00
RUNOFF	0.020	70.800	0.13
EVAPOTRANSPIRATION	13.674	49637.234	89.32
PERC./LEAKAGE THROUGH LAYER 2	0.082111	298.063	0.54
CHANGE IN WATER STORAGE	1.534	5569.204	10.02
SOIL WATER AT START OF YEAR	29.345	106522.633	
SOIL WATER AT END OF YEAR	30.879	112091.836	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.007	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	6.66	24175.801	100.00
RUNOFF	0.008	30.842	0.13

EVAPOTRANSPIRATION	5.523	20046.752	82.92
PERC./LEAKAGE THROUGH LAYER 2	0.435803	1581.964	6.54
CHANGE IN WATER STORAGE	0.693	2516.241	10.41
SOIL WATER AT START OF YEAR	30.879	112091.836	
SOIL WATER AT END OF YEAR	31.485	114292.156	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.087	315.917	1.31
ANNUAL WATER BUDGET BALANCE	0.0000	0.003	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.56	38332.801	100.00
RUNOFF	0.011	38.274	0.10
EVAPOTRANSPIRATION	9.925	36028.184	93.99
PERC./LEAKAGE THROUGH LAYER 2	0.337155	1223.873	3.19
CHANGE IN WATER STORAGE	0.287	1042.466	2.72
SOIL WATER AT START OF YEAR	31.485	114292.156	
SOIL WATER AT END OF YEAR	31.860	115650.539	

SNOW WATER AT START OF YEAR	0.087	315.917	0.82
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.005	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.19	40619.703	100.00
RUNOFF	0.072	261.016	0.64
EVAPOTRANSPIRATION	9.289	33718.125	83.01
PERC./LEAKAGE THROUGH LAYER 2	0.316221	1147.881	2.83
CHANGE IN WATER STORAGE	1.513	5492.693	13.52
SOIL WATER AT START OF YEAR	31.860	115650.539	
SOIL WATER AT END OF YEAR	33.110	120189.039	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.263	954.196	2.35
ANNUAL WATER BUDGET BALANCE	0.0000	-0.011	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.97	39821.098	100.00
RUNOFF	0.066	239.229	0.60
EVAPOTRANSPIRATION	7.261	26356.625	66.19
PERC./LEAKAGE THROUGH LAYER 2	0.531866	1930.673	4.85
CHANGE IN WATER STORAGE	3.111	11294.575	28.36
SOIL WATER AT START OF YEAR	33.110	120189.039	
SOIL WATER AT END OF YEAR	36.484	132437.812	
SNOW WATER AT START OF YEAR	0.263	954.196	2.40
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.006	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.72	49803.602	100.00
RUNOFF	0.128	465.415	0.93
EVAPOTRANSPIRATION	10.749	39019.492	78.35
PERC./LEAKAGE THROUGH LAYER 2	0.693746	2518.300	5.06
CHANGE IN WATER STORAGE	2.149	7800.406	15.66
SOIL WATER AT START OF YEAR	36.484	132437.812	
SOIL WATER AT END OF YEAR	38.565	139991.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.068	247.147	0.50
ANNUAL WATER BUDGET BALANCE	0.0000	-0.012	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.13	40401.902	100.00
RUNOFF	0.117	425.342	1.05
EVAPOTRANSPIRATION	8.754	31778.248	78.66
PERC./LEAKAGE THROUGH LAYER 2	0.847137	3075.107	7.61
CHANGE IN WATER STORAGE	1.411	5123.202	12.68

SOIL WATER AT START OF YEAR	38.565	139991.062	
SOIL WATER AT END OF YEAR	40.044	145361.422	
SNOW WATER AT START OF YEAR	0.068	247.147	0.61
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.005	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.78	68171.398	100.00
RUNOFF	0.303	1101.670	1.62
EVAPOTRANSPIRATION	10.997	39918.094	58.56
PERC./LEAKAGE THROUGH LAYER 2	1.312045	4762.724	6.99
CHANGE IN WATER STORAGE	6.168	22388.928	32.84
SOIL WATER AT START OF YEAR	40.044	145361.422	
SOIL WATER AT END OF YEAR	43.411	157583.047	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	2.801	10167.297	14.91
ANNUAL WATER BUDGET BALANCE	0.0000	-0.021	0.00

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ANNUAL TOTALS FOR YEAR 11

	INCHES	CU. FEET	PERCENT
PRECIPITATION	8.44	30637.199	100.00
RUNOFF	1.445	5244.315	17.12
EVAPOTRANSPIRATION	8.114	29453.187	96.14
PERC./LEAKAGE THROUGH LAYER 2	2.624547	9527.104	31.10
CHANGE IN WATER STORAGE	-3.743	-13587.399	-44.35
SOIL WATER AT START OF YEAR	43.411	157583.047	
SOIL WATER AT END OF YEAR	42.469	154162.953	
SNOW WATER AT START OF YEAR	2.801	10167.297	33.19
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

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ANNUAL TOTALS FOR YEAR 12

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.09	51146.695	100.00
RUNOFF	0.700	2542.020	4.97
EVAPOTRANSPIRATION	9.064	32901.531	64.33
PERC./LEAKAGE THROUGH LAYER 2	3.552256	12894.689	25.21
CHANGE IN WATER STORAGE	0.774	2808.464	5.49
SOIL WATER AT START OF YEAR	42.469	154162.953	
SOIL WATER AT END OF YEAR	43.243	156971.406	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.009	0.00

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ANNUAL TOTALS FOR YEAR 13

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.07	51074.102	100.00
RUNOFF	0.267	970.563	1.90

EVAPOTRANSPIRATION	10.793	39178.953	76.71
PERC./LEAKAGE THROUGH LAYER 2	1.945928	7063.719	13.83
CHANGE IN WATER STORAGE	1.064	3860.881	7.56
SOIL WATER AT START OF YEAR	43.243	156971.406	
SOIL WATER AT END OF YEAR	43.354	157376.516	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.952	3455.777	6.77
ANNUAL WATER BUDGET BALANCE	0.0000	-0.016	0.00

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ANNUAL TOTALS FOR YEAR 14

	INCHES	CU. FEET	PERCENT
PRECIPITATION	9.90	35937.004	100.00
RUNOFF	0.035	126.318	0.35
EVAPOTRANSPIRATION	10.059	36513.855	101.61
PERC./LEAKAGE THROUGH LAYER 2	1.241279	4505.842	12.54
CHANGE IN WATER STORAGE	-1.435	-5209.004	-14.49
SOIL WATER AT START OF YEAR	43.354	157376.516	
SOIL WATER AT END OF YEAR	42.871	155623.281	

SNOW WATER AT START OF YEAR	0.952	3455.777	9.62
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.009	0.00

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ANNUAL TOTALS FOR YEAR 15

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.34	41164.207	100.00
RUNOFF	0.009	33.392	0.08
EVAPOTRANSPIRATION	9.785	35519.531	86.29
PERC./LEAKAGE THROUGH LAYER 2	0.822795	2986.747	7.26
CHANGE IN WATER STORAGE	0.723	2624.534	6.38
SOIL WATER AT START OF YEAR	42.871	155623.281	
SOIL WATER AT END OF YEAR	43.269	157066.078	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.326	1181.737	2.87
ANNUAL WATER BUDGET BALANCE	0.0000	0.003	0.00

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ANNUAL TOTALS FOR YEAR 16

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.97	43451.094	100.00
RUNOFF	0.195	708.152	1.63
EVAPOTRANSPIRATION	9.694	35190.316	80.99
PERC./LEAKAGE THROUGH LAYER 2	2.022255	7340.787	16.89
CHANGE IN WATER STORAGE	0.058	211.860	0.49
SOIL WATER AT START OF YEAR	43.269	157066.078	
SOIL WATER AT END OF YEAR	42.969	155975.734	
SNOW WATER AT START OF YEAR	0.326	1181.737	2.72
SNOW WATER AT END OF YEAR	0.684	2483.951	5.72
ANNUAL WATER BUDGET BALANCE	0.0000	-0.023	0.00

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ANNUAL TOTALS FOR YEAR 17

	INCHES	CU. FEET	PERCENT

PRECIPITATION	8.38	30419.400	100.00
RUNOFF	0.015	53.567	0.18
EVAPOTRANSPIRATION	8.540	31001.947	101.92
PERC./LEAKAGE THROUGH LAYER 2	0.702681	2550.732	8.39
CHANGE IN WATER STORAGE	-0.878	-3186.842	-10.48
SOIL WATER AT START OF YEAR	42.969	155975.734	
SOIL WATER AT END OF YEAR	42.775	155272.844	
SNOW WATER AT START OF YEAR	0.684	2483.951	8.17
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.004	0.00

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ANNUAL TOTALS FOR YEAR 18

	INCHES	CU. FEET	PERCENT
PRECIPITATION	8.97	32561.094	100.00
RUNOFF	0.247	897.238	2.76
EVAPOTRANSPIRATION	5.838	21193.656	65.09
PERC./LEAKAGE THROUGH LAYER 2	2.254619	8184.268	25.14
CHANGE IN WATER STORAGE	0.630	2285.948	7.02

SOIL WATER AT START OF YEAR	42.775	155272.844	
SOIL WATER AT END OF YEAR	43.405	157558.781	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.016	0.00

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ANNUAL TOTALS FOR YEAR 19

	INCHES	CU. FEET	PERCENT
PRECIPITATION	7.87	28568.102	100.00
RUNOFF	0.144	523.016	1.83
EVAPOTRANSPIRATION	6.926	25141.875	88.01
PERC./LEAKAGE THROUGH LAYER 2	1.108296	4023.114	14.08
CHANGE IN WATER STORAGE	-0.309	-1119.881	-3.92
SOIL WATER AT START OF YEAR	43.405	157558.781	
SOIL WATER AT END OF YEAR	42.787	155318.172	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.309	1120.731	3.92
ANNUAL WATER BUDGET BALANCE	0.0000	-0.023	0.00

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ANNUAL TOTALS FOR YEAR 20

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.28	44576.406	100.00
RUNOFF	0.181	656.036	1.47
EVAPOTRANSPIRATION	9.092	33005.473	74.04
PERC./LEAKAGE THROUGH LAYER 2	2.616279	9497.093	21.31
CHANGE IN WATER STORAGE	0.391	1417.807	3.18
SOIL WATER AT START OF YEAR	42.787	155318.172	
SOIL WATER AT END OF YEAR	43.487	157856.719	
SNOW WATER AT START OF YEAR	0.309	1120.731	2.51
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.003	0.00

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ANNUAL TOTALS FOR YEAR 21

	INCHES	CU. FEET	PERCENT
PRECIPITATION	7.78	28241.402	100.00
RUNOFF	0.004	14.688	0.05
EVAPOTRANSPIRATION	5.220	18948.854	67.10
PERC./LEAKAGE THROUGH LAYER 2	1.125354	4085.036	14.46
CHANGE IN WATER STORAGE	1.431	5192.819	18.39
SOIL WATER AT START OF YEAR	43.487	157856.719	
SOIL WATER AT END OF YEAR	44.340	160953.344	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.577	2096.191	7.42
ANNUAL WATER BUDGET BALANCE	0.0000	0.006	0.00

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ANNUAL TOTALS FOR YEAR 22

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.70	38841.004	100.00
RUNOFF	0.123	447.496	1.15
EVAPOTRANSPIRATION	8.335	30255.957	77.90

PERC./LEAKAGE THROUGH LAYER 2	4.027022	14618.090	37.64
CHANGE IN WATER STORAGE	-1.785	-6480.529	-16.68
SOIL WATER AT START OF YEAR	44.340	160953.344	
SOIL WATER AT END OF YEAR	42.798	155357.328	
SNOW WATER AT START OF YEAR	0.577	2096.191	5.40
SNOW WATER AT END OF YEAR	0.334	1211.681	3.12
ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

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ANNUAL TOTALS FOR YEAR 23

	INCHES	CU. FEET	PERCENT
PRECIPITATION	14.75	53542.496	100.00
RUNOFF	0.086	313.451	0.59
EVAPOTRANSPIRATION	12.020	43631.605	81.49
PERC./LEAKAGE THROUGH LAYER 2	1.992104	7231.338	13.51
CHANGE IN WATER STORAGE	0.652	2366.103	4.42
SOIL WATER AT START OF YEAR	42.798	155357.328	
SOIL WATER AT END OF YEAR	43.483	157843.062	
SNOW WATER AT START OF YEAR	0.334	1211.681	2.26

SNOW WATER AT END OF YEAR	0.301	1092.047	2.04
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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ANNUAL TOTALS FOR YEAR 24

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.13	44031.902	100.00
RUNOFF	0.233	844.447	1.92
EVAPOTRANSPIRATION	10.362	37614.234	85.42
PERC./LEAKAGE THROUGH LAYER 2	2.730899	9913.165	22.51
CHANGE IN WATER STORAGE	-1.196	-4339.943	-9.86
SOIL WATER AT START OF YEAR	43.483	157843.062	
SOIL WATER AT END OF YEAR	42.588	154595.172	
SNOW WATER AT START OF YEAR	0.301	1092.047	2.48
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00

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ANNUAL TOTALS FOR YEAR 25

	INCHES	CU. FEET	PERCENT
PRECIPITATION	7.39	26825.703	100.00
RUNOFF	0.001	5.184	0.02
EVAPOTRANSPIRATION	5.430	19712.437	73.48
PERC./LEAKAGE THROUGH LAYER 2	1.367549	4964.202	18.51
CHANGE IN WATER STORAGE	0.591	2143.885	7.99
SOIL WATER AT START OF YEAR	42.588	154595.172	
SOIL WATER AT END OF YEAR	42.803	155373.844	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.376	1365.207	5.09
ANNUAL WATER BUDGET BALANCE	0.0000	-0.006	0.00

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ANNUAL TOTALS FOR YEAR 26

	INCHES	CU. FEET	PERCENT
PRECIPITATION	8.27	30020.098	100.00

RUNOFF 0.008 29.707 0.10

EVAPOTRANSPIRATION 7.055 25608.676 85.31

PERC./LEAKAGE THROUGH LAYER 2 1.456268 5286.252 17.61

CHANGE IN WATER STORAGE -0.249 -904.533 -3.01

SOIL WATER AT START OF YEAR 42.803 155373.844

SOIL WATER AT END OF YEAR 42.930 155834.516

SNOW WATER AT START OF YEAR 0.376 1365.207 4.55

SNOW WATER AT END OF YEAR 0.000 0.000 0.00

ANNUAL WATER BUDGET BALANCE 0.0000 -0.003 0.00

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ANNUAL TOTALS FOR YEAR 27

	INCHES	CU. FEET	PERCENT
PRECIPITATION	15.76	57208.809	100.00
RUNOFF	0.370	1343.783	2.35
EVAPOTRANSPIRATION	11.427	41479.070	72.50
PERC./LEAKAGE THROUGH LAYER 2	3.507973	12733.942	22.26
CHANGE IN WATER STORAGE	0.455	1652.044	2.89
SOIL WATER AT START OF YEAR	42.930	155834.516	

SOIL WATER AT END OF YEAR	43.385	157486.562	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.031	0.00

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ANNUAL TOTALS FOR YEAR 28

	INCHES	CU. FEET	PERCENT
PRECIPITATION	10.91	39603.301	100.00
RUNOFF	0.459	1664.423	4.20
EVAPOTRANSPIRATION	8.896	32292.486	81.54
PERC./LEAKAGE THROUGH LAYER 2	0.935767	3396.833	8.58
CHANGE IN WATER STORAGE	0.620	2249.570	5.68
SOIL WATER AT START OF YEAR	43.385	157486.562	
SOIL WATER AT END OF YEAR	43.912	159401.281	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.092	334.855	0.85
ANNUAL WATER BUDGET BALANCE	0.0000	-0.014	0.00

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ANNUAL TOTALS FOR YEAR 29

	INCHES	CU. FEET	PERCENT
PRECIPITATION	8.48	30782.404	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	9.026	32762.951	106.43
PERC./LEAKAGE THROUGH LAYER 2	0.194604	706.414	2.29
CHANGE IN WATER STORAGE	-0.740	-2686.952	-8.73
SOIL WATER AT START OF YEAR	43.912	159401.281	
SOIL WATER AT END OF YEAR	43.264	157049.172	
SNOW WATER AT START OF YEAR	0.092	334.855	1.09
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.007	0.00

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ANNUAL TOTALS FOR YEAR 30

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.76	49948.805	100.00
RUNOFF	0.003	12.415	0.02
EVAPOTRANSPIRATION	11.320	41093.047	82.27
PERC./LEAKAGE THROUGH LAYER 2	2.294668	8329.646	16.68
CHANGE IN WATER STORAGE	0.142	513.681	1.03
SOIL WATER AT START OF YEAR	43.264	157049.172	
SOIL WATER AT END OF YEAR	43.406	157562.859	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.016	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.67	0.66	1.27	0.72	0.79	0.53

1.07 1.49 0.86 1.12 0.96 0.88

STD. DEVIATIONS 0.46 0.54 0.86 0.64 0.66 0.71
0.91 1.47 1.19 1.25 0.89 0.95

RUNOFF

TOTALS 0.049 0.007 0.005 0.000 0.001 0.002
0.023 0.047 0.017 0.011 0.007 0.006

STD. DEVIATIONS 0.244 0.021 0.024 0.000 0.005 0.008
0.063 0.133 0.068 0.040 0.032 0.031

EVAPOTRANSPIRATION

TOTALS 0.592 0.712 1.017 0.854 0.781 0.520
0.609 0.994 0.669 0.749 0.752 0.589

STD. DEVIATIONS 0.309 0.437 0.608 0.509 0.674 0.477
0.458 0.834 0.554 0.648 0.436 0.351

PERCOLATION/LEAKAGE THROUGH LAYER 2

TOTALS 0.0431 0.0667 0.1423 0.0748 0.0594 0.0485
0.0925 0.1752 0.2661 0.1687 0.1718 0.1284

STD. DEVIATIONS 0.1219 0.1486 0.2299 0.0825 0.0561 0.0536
0.1222 0.2320 0.4853 0.4391 0.4053 0.2413

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH
30

	INCHES	CU. FEET	PERCENT
PRECIPITATION	11.02 (3.058)	40009.9	100.00

RUNOFF	0.175	(0.2900)	636.05	1.590
EVAPOTRANSPIRATION	8.839	(2.1973)	32083.78	80.190
PERCOLATION/LEAKAGE THROUGH LAYER 2	1.43741	(1.11828)	5217.812	13.04131
CHANGE IN WATER STORAGE	0.571	(1.7025)	2072.22	5.179

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	3.61	13104.300
RUNOFF	1.289	4678.1919
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.146586	532.10699
SNOW WATER	3.28	11902.0566
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2519	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0240	

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.3798	0.0767
2	42.0260	0.2918

SNOW WATER 0.000

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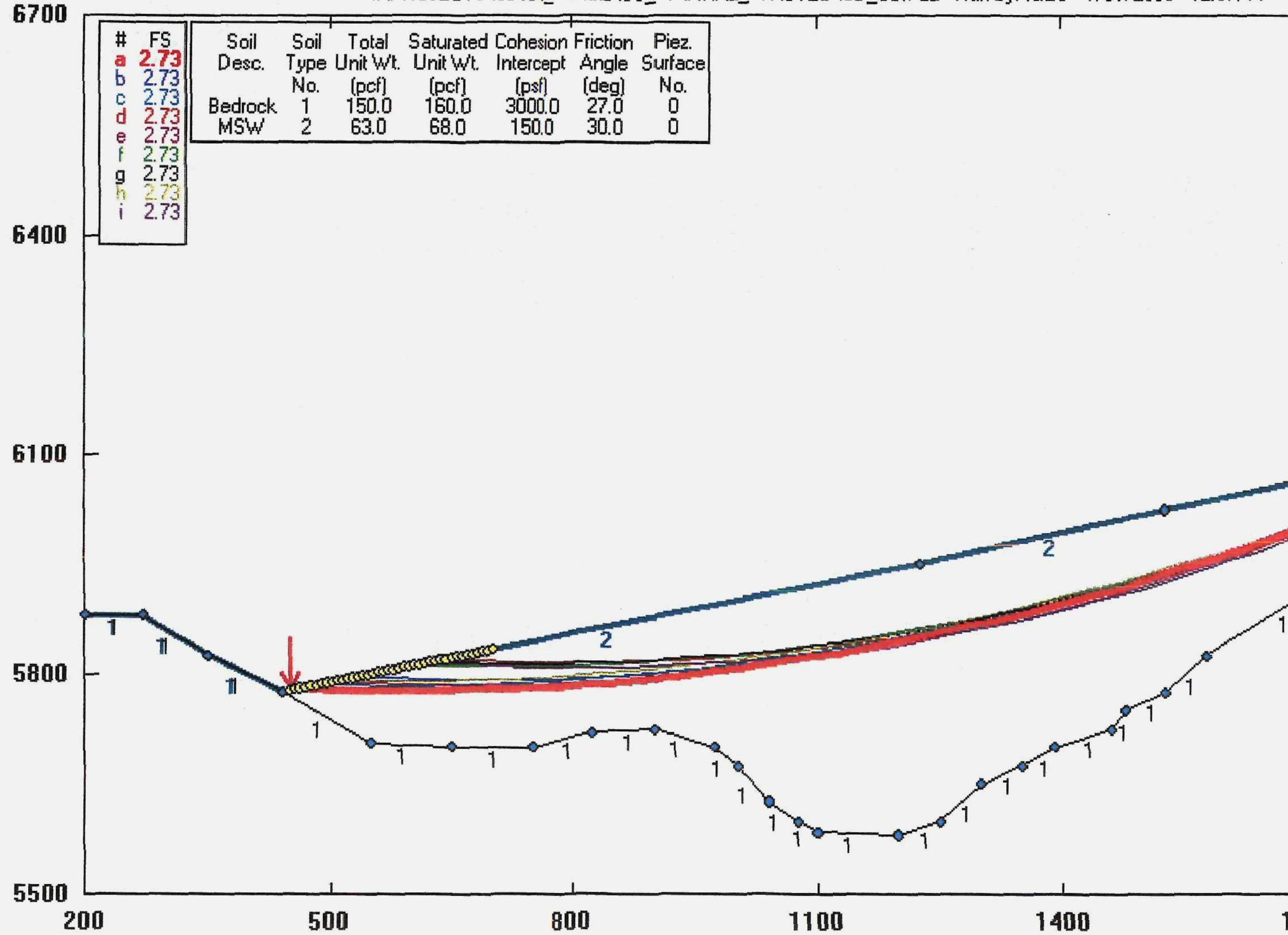
APPENDIX H

Slope Stability

Iron County Landfill C&D Landfill Phase IV Final Cover - Static

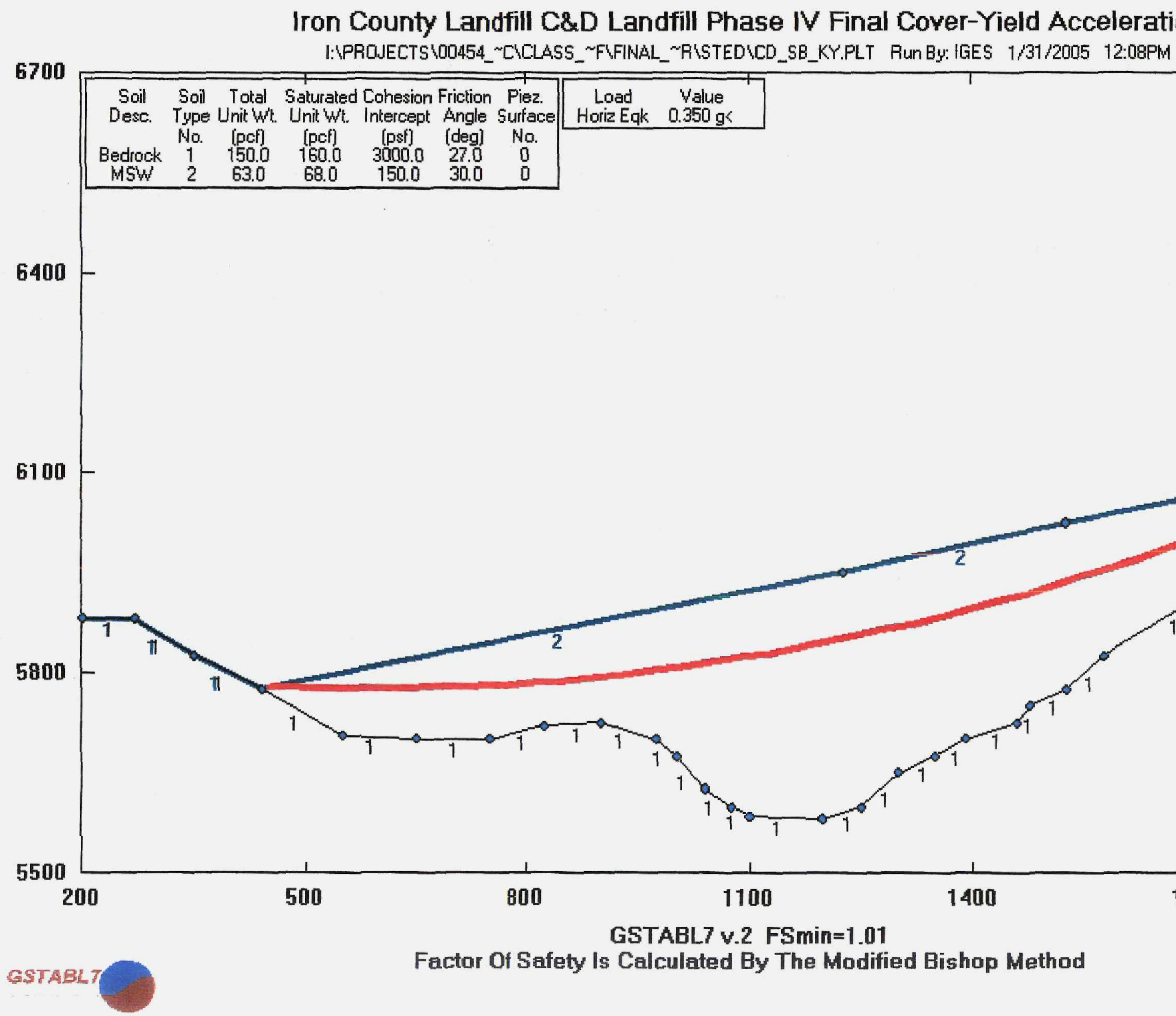
I:\PROJECTS\00454_~C\CLASS_~F\FINAL_~R\STED\CD_SB.PL2 Run By: IGES 1/31/2005 12:07PM



GSTABL7 v.2 FSmin=2.73

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7



Iron County Landfill C&D Landfill Phase IV Final Cover-Yield Accelerati
I:\PROJECTS\00454_~C\CLASS_~F\FINAL_~R\STED\CD_SB_KY.PLT Run By: IGES 1/31/2005 12:08PM
Soil Desc. | Soil Type No. | Total Unit Wt. (pcf) | Saturated Unit Wt. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Piez. Surface No.
Bedrock 1 150.0 160.0 3000.0 27.0 0
MSW 2 63.0 68.0 150.0 30.0 0
Load Value
Horiz Eqk 0.350 g<
6700
6400
6100
5800
5500
200
500
800
1100
1400
GSTABL7 v.2 FSmin=1.01
Factor Of Safety Is Calculated By The Modified Bishop Method
GSTABL7

APPENDIX I

Closure/Post-Closure Costs

ARMSTRONG - PIT CLOSURE COSTS

Section 1.0 - Engineering

(ESTIMATED DATE OF CLOSURE= 2036. AREA= 1,460,000 FT SQ)

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Topographic Survey	LS	$7,000	1	$7,000
1.2	Boundary Survey for Closure	NA	$2,500	1	$2,500
1.3	Site Evaluation	NA		1	$0
1.4	Development of Plans (Cover and Gas Collection)	LS	$12,000	1	$12,000
1.5	Contract Administration - (Bidding and Award)	LA	$2,500	1	$2,500
1.6	Administrative Costs - (Certification of Final Cover and Closure Notice)	LS	$6,000	1	$6,000
1.7	Project Management - (Construction Observation and Testing)	LS	$14,000	1	$14,000
1.8	Monitor Well Consultant Cost	NA			$0
1.9	Other Environmental Permit Costs	NA			$0
				Engineering Subtotal	$44,000

Section 2.0 - Construction

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Final Cover System				
2.1.1	*Site Preparation/ Site Regrading*	ACRE	$1,000	34.0	$34,000
2.1.2	*Gas Collection Layer/Pipes*	Included below			$0
2.1.3	*Low permeability Layer (Soil - If Applicable)*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	NA			$0
c	Soil Transportation	NA			$0
d	Soil Placement	NA			$0
e	Soil Amendment (compact)	NA			$0
2.1.4	*Low permeability Layer (Synthetic - If Applicable)*				
a	Geotextile	NA			$0
b	GCL	SQ FT	$0.50	1,460,000	$730,000
c	Geomembrane (HDPE,PVC,LLDPE,etc...)	SQ FT			$0
2.1.5	*Drainage Layer (Soil - If Applicable)*				
a	Geotextile	NA			$0
b	Sand/Gravel	NA			$0
2.1.6	*Drainage Layer (Synthetic - If Applicable)*				
a	Geotextile	NA			$0
b	Geonet/Geocomposite	SQ FT			$0
2.1.7	*Erosion Protection Soil Layer*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	CY	$0.50	81,111	$40,556
c	Soil Transportation	CY	$2.00	81,111	$162,222
d	Soil Placement	CY	$0.75	81,111	$60,833
e	Soil Amendment (compact)	CY			$0
2.1.8	*Topsiol Layer*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	CY	$0.50	27,037	$13,519
c	Soil Transportation	CY	$2.00	27,037	$54,074
d	Soil Placement	CY	$0.75	27,037	$20,278
e	Soil Amendment	NA			$0
2.1.9	*Revegetation*				
a	Seeding	ACRE	$800	34.0	$27,200
b	Fertilizing	ACRE	$800	34.0	$27,200
c	Mulch	ACRE	$200	34.0	$6,800
d	Tacifier	ACRE	$200	34.0	$6,800
2.2	Stormwater Protection Structures				
a	Culverts	NA			$0
b	Pipes	NA			$0
c	Ditches/Berms	FT	$16	6,500	$104,000
d	Detention Basins	NA			$0
2.3	Gas Collection System				
a	Design	Included In Section 1.0			$0
b	Additional Gas Collection Wells and Connection	EA			$0
2.4	Leachate Collection System				
a	Design	NA			$0
b	Additional Equipment / Installation	NA			$0
2.5	Groundwater Monitoring System				
a	Monitor Well Installation	NA			$0
b	Monitor Well Abandonment	NA			$0
2.6	Site Security				
a	Lighting, signs, etc...	NA			$0
b	Fencing and Gates	NA			$0
2.7	Miscellaneous				
a	Performance Bonds	LS	$10,000	1	$10,000
b	Contract/Legal fees	LS	$5,000	1	$5,000
				Construction Subtotal	$1,302,481

Total	$1,346,481
10% Contingency	$134,648
Subtotal Closure Cost	$1,481,129

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

LINDSEY - PIT CLOSURE COSTS

Section 1.0 - Engineering

(ESTIMATED DATE OF CLOSURE=2058, AREA=1,460,000 FT SQ)

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Topographic Survey	LS	$7,000	1	$7,000
1.2	Boundary Survey for Closure	NA	$2,500	1	$2,500
1.3	Site Evaluation	NA			$0
1.4	Development of Plans (Cover)	LS	$12,000	1	$12,000
1.5	Contract Administration - (Bidding and Award)	LA	$2,500	1	$2,500
1.6	Administrative Costs - (Certification of Final Cover and Closure Notice)	LS	$3,000	1	$3,000
1.7	Project Management - (Construction Observation and Testing)	LS	$7,000		$0
1.8	Monitor Well Consultant Cost	NA			$0
1.9	Other Environmental Permit Costs	NA			$0
				Engineering Subtotal	$27,000

Section 2.0 - Construction

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Final Cover System				
2.1.1	*Site Preparation/ Site Regrading*	ACRE	$1,000	34.0	$34,000
2.1.2	*Gas Collection Layer/Pipes*	Included below			
2.1.3	*Low permeability Layer (Soil - If Applicable)*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	NA			$0
c	Soil Transportation	NA			$0
d	Soil Placement	NA			$0
e	Soil Amendment (compact)	NA			$0
2.1.4	*Low permeability Layer (Synthetic - If Applicable)*				
a	Geotextile	NA			$0
b	GCL	NA			$0
c	Geomembrane (HDPE,PVC,LLDPE,etc...)	NA			$0
2.1.5	*Drainage Layer (Soil - If Applicable)*				
a	Geotextile	NA			$0
b	Sand/Gravel	NA			$0
2.1.6	*Drainage Layer (Synthetic - If Applicable)*				
a	Geotextile	NA			$0
b	Geonet/Geocomposite	NA			$0
2.1.7	*Erosion Protection Soil Layer*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	CY	$0.50	81,111	$40,556
c	Soil Transportation	CY	$2.00	81,111	$162,222
d	Soil Placement	CY	$0.75	81,111	$60,833
e	Soil Amendment (compact)	CY			$0
2.1.8	*Topsiol Layer*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	CY	$0.50	27,037	$13,519
c	Soil Transportation	CY	$2.00	27,037	$54,074
d	Soil Placement	CY	$0.75	27,037	$20,278
e	Soil Amendment	NA			$0
2.1.9	*Revegetation*				
a	Seeding	ACRE	$800	34.0	$27,200
b	Fertilizing	ACRE	$800	34.0	$27,200
c	Mulch	ACRE	$200	34.0	$6,800
d	Tacifier	ACRE	$200	34.0	$6,800
2.2	Stormwater Protection Structures				
a	Culverts	NA			$0
b	Pipes	NA			$0
c	Ditches/Berms	FT	$16	3,500	$56,000
d	Detention Basins	NA			$0
2.3	Gas Collection System				
a	Design	Included In Section 1.0			$0
b	Additional Gas Collection Wells and Connection	LS			$0
2.4	Leachate Collection System				
a	Design	NA			$0
b	Additional Equipment / Installation	NA			$0
2.5	Groundwater Monitoring System				
a	Monitor Well Installation	NA			$0
b	Monitor Well Abandonment	NA			$0
2.6	Site Security				
a	Lighting, signs, etc...	NA			$0
b	Fencing and Gates	NA	$1,000	1	$1,000
2.7	Miscellaneous				
a	Performance Bonds	LS	$10,000		$0
b	Contract/Legal fees	LS	$5,000	1	$5,000
				Construction Subtotal	$515,481

Total	$542,481
10% Contingency	$54,248
Subtotal Closure Cost	$596,729

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

LANDFILL POST-CLOSURE COSTS (30 YEARS)

Section 1.0 - Engineering

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	**Post-Closure Plan**	NA			$0
1.2	**Annual Report** (including results from gas, leachate, and ground water sampling - details of maintenance performed)	LS	$2,500	30	$75,000
a	Quarterly Site Inspections	LS	$320	120	$38,400
b	Plan Update	LS	$200	30	$6,000
				Engineering Subtotal	$119,400

Section 2.0 - Gas Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	**Sample Collection**	LS			$0
2.2	**Sample Analysis**	NA			$0
2.3	**Report** (Part of Annual Report)				
		Gas Collection System - Sampling Subtotal			$0

Section 3.0 - Leachate Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	**Sample Collection**	LS			$0
2.2	**Sample Analysis**	NA			$0
2.3	**Report** (Part of Annual Report)				
		Leachate Collection System - Sampling Subtotal			$0

Section 4.0 - Ground Water Monitoring System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
3.1	**Sample Collection**	LS	$320	120	$38,400
3.2	**Sample Analysis**	LS	$3,000	120	$360,000
3.3	**Report**	LS	$7,500	30	$225,000
	Ground Water Collection System - Sampling Subtotal				$623,400

Section 5.0 - Facility Operations and Maintenance

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
4.1	**Cover**				
a	Soil Replacement	LS	$2,000	30	$60,000
b	Vegetation/Reseeding	LS	$1,000	30	$30,000
4.2	**Storm Water Protection Structures**				
a	Ditch and Culvert Maintenance	LS	$500	30	$15,000
b	Berm and Basin Maintenance	LS	$500	30	$15,000
4.3	**Gas Collection System**				
a	System Operation	NA			$0
b	System Repair	LS			$0
4.4	**Leachate Collection System**				
a	System Operation	NA		30	$0
b	System Repair	NA		30	$0
4.5	**Ground Water Monitoring System**				
a	System Operation	NA		30	$0
b	System Repair	LS	$1,000	30	$30,000
4.6	**Site Security**				
a	Lighting, signs, etc...	LS	$500	30	$15,000
b	Fencing and Gates	LS	$500	30	$15,000
4.7	**Miscellaneous**				
a					
b					
		Facility Operations and Maintenance Subtotal			$180,000

Total	$922,800
10% Contingency	$92,280
Total Post-Closure Cost	$1,015,080

LANDFILL CLOSURE AND POST-CLOSURE COSTS

Armstrong Closure Costs - 2044			
	Section 1.0 - Engineering	$44,000	
	Section 2.0 - Construction	$1,302,481	
	10% Contingency	$134,648	
	Subtotal		$1,481,129
Lindsey Closure Costs - 2094			
	Section 1.0 - Engineering	$27,000	
	Section 2.0 - Construction	$515,481	
	10% Contingency	$54,248	
	Subtotal		$596,729
Armstrong & Lindsey Landfill Post-Closure Costs (30 years)			$1,015,080
TOTAL LANDFILL CLOSURE AND POST-CLOSURE COSTS			$3,092,938